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CONTENTS

PAGE

I. THE COAL COMMISSION REPORTS AND THE COAL SITUATION - - - - - - - *M. B. Hammond* 541

II. SOME FALLACIES IN THE INTERPRETATION OF SOCIAL COST - - - - - - - *F. H. Knight* 582

III. THE UNITED STATES STEEL CORPORATION AND INDUSTRIAL STABILIZATION - - *Abraham Berglund* 607

IV. COMPETITIVE ILLUSION AS CAUSE OF BUSINESS CYCLES - - - - - *Thomas Warner Mitchell* 631

V. THE IMMIGRATION LAW OF 1924 *Henry Pratt Fairchild* 653

REVIEWS:

New Books on the Principle of Population *C. P. Wright* 666

Wolfe's Conservatism, Radicalism, and Scientific Method *Z. Clark Dickinson* 682

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CONTENTS FOR FEBRUARY, 1924

I. THE AGRICULTURAL DEPRESSION . . . . . G. F. Warren
II. FINANCIAL AND MONETARY POLICY IN GREAT BRITAIN DURING THE NAPOLEONIC WARS . . . . . Norman J. Silberling
III. THE DENOMINATIONS OF THE CURRENCY IN RELATION TO THE GOLD PROBLEM . . . . . Oliver Cary Lockhart
IV. FAMILY ALLOWANCES AND CLEARING FUNDS IN FRANCE Paul H. Douglas
V. EARLIER THEORIES OF CRISES AND CYCLES IN THE UNITED STATES . . . . . Harry E. Miller

REVIEWS:

Ross's Russian Soviet Republic . . . . . E. Dana Durand
Dawes's Budget of the United States . . . . . Fred Rogers Fairchild
Kyrk's Theory of Consumption . . . . . Z. Clark Dickinson

NOTES AND MEMORANDA:

Automatic Saving and the Rate of Accumulation . . . . T. N. Carver
America's New Commercial Policy as Illustrated by Our Commercial Relations with Brazil . . . . . W. S. Culbertson

CONTENTS FOR MAY, 1924

I. A FORECAST OF THE FUTURE OF AMERICAN RAILROADS Winthrop M. Daniels
II. THE CASE FOR INDUSTRIAL DUALISM . . . . . Edward Alsworth Ross
III. FINANCIAL AND MONETARY POLICY OF GREAT BRITAIN DURING THE NAPOLEONIC WARS . . . . . Norman J. Silberling
IV. NO-PAR STOCK: ITS ECONOMIC AND LEGAL ASPECT . James C. Bonbright
V. UNITED STATES COMMERCE WITH LATIN AMERICA AT THE PROMULGATION OF THE MONROE DOCTRINE Charles Lyon Chandler

REVIEW:

Clark's Economics of Overhead Costs . . . . . T. H. Sanders

NOTES AND DISCUSSIONS:

Professor Edgeworth's Views on Index Numbers . . . . C. M. Walsh
The Economic Law of Market Areas . . . . . Frank A. Fetter
Coöperative Production among Shingle-Weavers . . . . George M. Janes

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THE
QUARTERLY JOURNAL
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ECONOMICS

AUGUST, 1924

THE COAL COMMISSION REPORTS AND THE COAL SITUATION

SUMMARY

Importance of the coal problem, 541. — I. Occasion for appointment of the Commission, 543. — The Federal Act of October, 1923, 547. — Personnel of the Commission, 548. — II. The bituminous branch of the industry; striking irregularity of production, 550. — The causes: seasonal demand, strikes, overdevelopment above all, 551. — Effects on labor, 559. — No radical remedy proposed by the Commission, 560. — Changes in railroad car distribution recommended, 561. — Readjustment of freight rates, 563. — The Commission fails to urge the use by the Interstate Commerce Commission of its power to veto building of lines or sidings not needed, 565. — III. Anthracite coal problems simpler, 566. — The fundamental problem is that of monopoly, 568. — The Commission proposes a graded tax on royalties, 570. — IV. Unionization and non-union fields, 572. — The Commission on the whole commends the United Mine Workers, condemns operators in non-union fields, yet takes a neutral attitude, 573. — V. The Reports have high educational value, the remedies suggested are inadequate, 577. — Some more far-reaching plan must come, 581.

It is nearly sixty years since that acute thinker and brilliant economic writer, W. Stanley Jevons, called the attention of the British nation to the importance of coal as a basis for Britain's prosperity, and made the Cassandra-like prediction that the slow but steady exhaustion of her coal supply spelled the downfall of England's primacy among the industrial nations and might even carry with it her loss of the moral and intellectual leadership of the world. Since Jevons's time the industrial

leadership among nations has, indeed, passed from Great Britain to the United States. But the foundation of that leadership has not changed. Predictions are at times made, it is true, that some other source of power and heat — oil, electricity generated by water-power, perhaps even the direct rays of the sun — will supplant coal in this respect. They may do so, but at present they appear as only the faint possibilities of a far distant future. To pin our faith to any one of them as our excuse for neglecting the conservation of our coal would be to commit an act of supreme folly. In respect to our own dependence on coal, Jevons's words of 1865 are as true of the United States of today as they were true of Great Britain at the time they were written.

> Coal in truth stands not beside but entirely above all other commodities. It is the material source of the energy of the country — the universal aid — the factor in everything we do. With coal almost any fact is possible or easy; without it we are thrown back into the laborious poverty of early times. . . . A little reflection will show that coal is almost the sole necessary basis of our material power and is that, consequently, which gives efficiency to our moral and intellectual capabilities. [1]

As Jevons pointed out, it is not the physical exhaustion of coal resources which brings loss of industrial prosperity. Long before this could happen, the increasing cost of mining coal would put an end to international competition in manufacturing by that nation whose fuel costs were high compared to those of her competitors whose fuel costs were low.

Altho in our own country here and there a writer may be found who has appreciated the fact that the rapid increase in the rate of consumption of our coal, coupled with wasteful mining methods, points to a time when we are likely to be face to face with the prospect of losing our manufactures, generally speaking such national

1. Jevons, The Coal Question, Third Edition, edited by A. W. Flux (1906), pp. 2, 3.

concern regarding coal as we have manifested has had its origin, not in the threat of depletion, but in the more immediate danger of non-continuous production. It was the inconvenience and even suffering which resulted from the coal strikes of 1919 and 1920 and the probability of a further suspension in 1922 which led, in the latter year, to the public demand for the appointment of the United States Coal Commission. This Commission has pointed out, in language as eloquent as that of Jevons, the extent of the people's dependence upon coal and the consequences which flow from even a temporary suspension of either its mining or its transportation.

> This dependence upon coal is not only country-wide but all-embracing; every man, woman and child is the beneficiary of coal. So it is that absolute public necessity is back of the demand for continuous service from the coal mine and from every agency responsible for the transfer of coal from mine to place of use. As the direct source of the energy that turns most of the wheels of an industrial nation, coal affects the community at large to a degree that is not generally realized until the continuity of this service is threatened. Twice within four years both transportation and industry have been threatened with partial paralysis due to wage disputes in the coal industry. The dependence of our whole industrial structure upon the continuous production of coal has been too obviously demonstrated by these two instances to leave room for any further debate on the relation of coal to the public interest.[2]

I

The immediate occasion for the appointment of the United States Coal Commission was the failure of the United Mine Workers of America to negotiate agreements with both bituminous and anthracite coal operators, to take the place of agreements in the Central Competitive Field of the bituminous branch of the industry which expired on March 31, 1922. The opera-

2. U. S. Coal Commission, Report S (Final Report), mimeographed copy, p. 3. (Future references to the Commission's reports will be by letter and page only.)

tors in most of the districts in which agreements had been made with the union were willing to negotiate separate agreements with the union representatives in their districts, but made known the fact that in such negotiations they should demand from the miners certain concessions, such as a reduction in wage rates and the abolition of the "check-off" — the latter being an arrangement whereby the operators collected for the organization its dues and assessments and the fines imposed by the organization on miners who had violated union rules. The union, on the other hand, insisted that district agreements should be based on an interstate agreement entered into between the United Mine Workers and those operators who recognize the union in the bituminous fields, and that an agreement between the union and the anthracite operators should run from the same date. They let it be known that they would ask for an increase in the rates of pay and an extension of the "check-off" to the anthracite fields, and that, in the bituminous fields, they would demand a six-hour day and a five-day week, in order that production of coal might proceed in a more regular fashion throughout the year. Statistics collected by the United States Geological Survey show that in the bituminous fields a miner can expect to find work not more than three or four days a week, on an average, even during boom periods; while during the year 1921 the bituminous miners averaged only 2.8 days a week.[3]

The failure of the parties to agree led the officers of the United Mine Workers to order members of the organization to cease work on April 1, 1922, and the order was generally obeyed by the union miners. Out of a total of 795,000 men employed, 610,000 suspended operations on April 1. Those continuing to work after

3. Quoted in Monthly Labor Review, vol. xv, p. 943 (Nov. 1922, p. 13).

that date were for the most part the non-union miners employed in the bituminous mines of the Southern Appalachian Mountains, extending from Southern Pennsylvania to Alabama, to which must be added about 25,000 miners, not yet organized, in the mines west of the Mississippi River.[4]

The Federal Government made no serious effort to end the strike in the coal fields until three months had passed. But when it became evident that the non-union fields could not supply the coal required to supply domestic needs, President Harding invited representatives of the operators and of the union to Washington, and urged them to settle their differences. When they failed to do so, the President proposed that operations on the same terms and conditions that prevailed on March 31 be resumed, and that miners submit their differences to a Coal Commission to be created immediately. The Commission was to consist of three representatives selected by the union, three by the operators and five to be named by the President. This Commission should settle the immediate issues involved, within thirty days, and should then enter upon an extended investigation of all phases of the coal industry and make its report and recommendations in time to allow them to be made use of when negotiations were entered into for a new agreement to date from March 1, 1923.[5]

The United Mine Workers declined the President's proposals, not because they were opposed to a "fact-finding Commission," but because the operators represented at the Washington Conference represented only a little more than half the tonnage in the strike fields and had no authority to bind the unrepresented opera-

4. Margaret Gadsby, The Coal Strikes, Monthly Labor Review, vol. xv, p. 944 (Nov. 1922, p. 14). This article gives a good account of the efforts made to secure agreements and the reasons for their failure.

5. Gadsby, loc. cit., p. 945.

tors.[6] The conference was dismissed by the President without accomplishing anything. But during the summer, agreements were reached in both the bituminous and the anthracite fields.

The bituminous agreement provided not only for a resumption of mine operations but for a conference of operators and miners to negotiate a new wage scale and to select a joint committee of inquiry, if possible, whose personnel would be approved by the President of the United States. The investigation by this joint committee, it was stated, "shall include every phase of the industry deemed material by the committee of inquiry and such committee shall be furnished with all information desired, and aided in every manner possible by the operators and miners alike."[7] The expenses of the inquiry were to be paid by the industry, one half by the operators and one half by the United Mine Workers. If the joint conference could not agree on the members of the committee of inquiry by October 10, it was to petition the President of the United States "to appoint the members thereof in his discretion."

The anthracite miners and operators, in their agreement reached on September 2, united in a recommendation to Congress to create "a separate Anthracite Coal Commission with authority to investigate and report promptly on every phase of the industry." The agreement further provided that a continuance of production after August 31, 1923, should be upon such terms as the parties might agree to in the light of the report of the Commission.[8]

Before the conference provided for by the bituminous agreement had assembled, Congress had taken action, on September 22, by passing a law creating a United

6. Gadsby, loc. cit., p. 946.

7. Text of agreement quoted in ibid., p. 948.

8. Ibid., p. 20.

States Coal Commission of seven persons to be appointed by the President, "to investigate and ascertain fully the facts and conditions and study the problems and questions relative to the coal industry with a view to and for the purpose of aiding, assisting, and advising Congress in matters of legislation which will insure a supply of this commodity to the industries and the people generally throughout the country and maintain the uninterrupted flow of commerce among the States," etc.[9] The request of the anthracite miners and operators for a separate investigation of their side of the industry was met by providing that such a separate investigation should be made and a report made thereon on or before July 1, 1923. The Commission was to complete all its work within a year from the passage of the act creating the Commission, that is, by September 22, 1923.

When the conference of bituminous operators and miners met on October 2, the Federal Act providing for the appointment of the United States Coal Commission had already been passed. Secretaries Davis and Hoover had asked miners and operators to submit a panel of names from which the personnel of the United States Coal Commission might be drawn. The conference thereupon decided that no fact-finding commission within the industry should be appointed, and voted its support to the United States Coal Commission. The miners nominated a panel of names from which their representatives might be drawn and sent it to the President; but the operators declined to make nominations, saying that they had "full confidence in the wisdom and fairness of the President."[1]

Perhaps it was because of the failure of the operators to make nominations that the President decided to ap-

9. Public Act, No. 347, quoted in Monthly Labor Review, vol. xv, p. 123 (Nov. 1922, p. 193).

1. Gadsby, loc. cit., p. 949.

point no representatives of either the miners or the operators as members of the Commission. To the writer of this article this appears, at the present time, to have been a mistake. Had there been on the Commission representatives of both the operators and miners, it is not unlikely that there might have developed such differences of opinion in regard to certain matters of importance that a unanimous decision on such points could not have been obtained. On the other hand, to the extent to which such representatives did agree on a statement of facts and on the proposal of a remedy, their recommendations would probably have carried more weight with their constituents, and certainly could not have been ignored by both parties in the way in which the recommendations of the Commission have been neglected up to date.

The President appointed on October 10 as members of the United States Coal Commission, Messrs. John Hays Hammond, Thomas R. Marshall, Clark Howell, George Otis Smith, Edward T. Devine, Charles P. Neill, and Samuel Alschuler. Judge Alschuler was not released from his duties as a Federal judge, and therefore resigned as a member of the Commission; and the vacancy created by the resignation was never filled. Only two of the members could be said to have been familiar at the time of their appointment with the problems of the coal industry. Mr. George Otis Smith, as Director of the United States Geological Survey, was in a position to assemble all the facts relating to the coal industry and had helped to direct the Government's control of the industry during the war. Dr. Neill had served as impartial umpire in the anthracite industry ever since the Anthracite Coal Commission of 1902 had provided for such an official, and was therefore very familiar with the problems of that branch of the coal in-

dustry. As United States Commissioner of Labor for a term of years, he had also familiarity with the methods and obligations of official investigation. Mr. John Hays Hammond, who was elected chairman of the Commission, was a mining engineer of international reputation, but his experience had been chiefly in the field of metal mining. Dr. Devine, tho not an expert in coal, was a well-known writer and teacher in the field of social economy and was well qualified to appreciate and direct scientific investigation. Former Vice-President Marshall and Mr. Howell, editor of the *Atlanta Constitution*, tho neither scientifically trained nor especially familiar with the coal industry, were men well known to the public at large, and brought to their work an intelligent appreciation of the public point of view.

Viewed as a whole, the Commission was of such a character as to command public confidence in its ability and impartiality. Of perhaps even greater importance for the success of the undertaking was the fact that the staff of investigators selected to conduct the inquiry was composed of men who by training and experience were well qualified for their work, and the further fact that the funds provided by Congress for the investigation were sufficient for the purpose. Of the six hundred thousand dollars appropriated there was even a small balance turned back to the Treasury at the time the work was completed.

Perhaps the chief criticism to be made of the work of the Commission, for which it is hardly responsible, relates to the form of presentation of its reports. More than a score of reports, besides many supplementary tables of figures, were released for the press on mimeographed typewritten sheets during the summer and autumn of 1923. In this form they constitute, up to the present time, the only medium through which the

public has been informed of the results of this colossal and expensive piece of investigation. Even the student of the coal question balks at handling material presented in such a shape. Our leading newspapers and magazines either have neglected the reports altogether or have passed them over with scornful and superficial comment, while the national convention of the party in power, which planned the investigation, provided the funds, and appointed the Commission, makes no mention in its party platform of the work of the Commission or of its recommendations.

Owing to the multiplicity of the reports and the variety of the subjects therein dealt with, no attempt will be made in the following pages to cover the entire field of the investigations. Attention will be given to a few of the leading reports, and the conclusions and recommendations of the Commission contained therein. These matters seem to the writer to be vital to an understanding of the coal situation as it now exists in the United States. A settlement of these issues would make possible the solution of other problems which, on the surface, seem more important and perplexing. By seeking to make clear what these vital issues are, it may be hoped that the reader will be enabled to see their significance in relation to the problems of the coal industry which periodically reappear, to our annoyance and confusion alike.

II

The bituminous branch of the coal industry far surpasses the anthracite branch in industrial importance and in the magnitude of its operations. It is, therefore, proper that we should first discuss the conditions prevailing in this branch of the industry which make for instability within the industry and in the industrial life of the nation as well.

The amount of bituminous coal necessary to supply our needs each year during the last ten or twelve years (if we omit the years 1916–1918, inclusive, whose unusual activities were the result of the war) was on the average about 450,000,000 tons. The mines operating in the year 1905 or any subsequent year could easily have produced this amount, for at no time during the last thirty years has the demand for coal in any one year been sufficient to keep the mines running throughout the year. Even during the boom years of the war, the capacity of the mines was far in advance of the total output needed, and the average number of days of work lost per year by the men employed in bituminous coal mining was never less than 59;[2] this is on the basis of 308 days a year constituting full working time. Because of local holidays, mine disability, etc., the true figure of possible working days at the majority of the mines is less than this, perhaps not above 290 days a year; but the actual days worked during the thirty years, 1890–1919, was on an average not above 215.[3] For the following four years the average working year contained only 190 days.[4]

The causes of the irregular operation of the bituminous mines the Commission finds to be four in number: "lack of market for the coal, lack of railroad transportation to take this coal from mine to market, labor shortage or strikes, and mine disability."[5] Of these four, mine disability is of slight importance, lack of transportation or "car shortage," which is frequently cited by operators as the chief cause, is of significance only as it affects the individual mine. If every mine were supplied with cars as needed, the total number of days of mine operation of all the mines would hardly exceed the

2. Report E, p. 10.
3. Ibid., p. 20.
4. Ibid., p. 10.
5. Ibid., p. 20.

present number, for the demand for coal would not permit of more. Labor shortage is something which affects only individual mines, for the total number of men employed in and about the mines is largely in excess of the number needed. Major strikes as a cause of irregular production are important for certain years, notably 1919 and 1922, and local strikes cause annoyance to individual operators, and may reduce the number of days of operation of the mines at which they occur. On the whole, however, neither labor shortage nor strikes constitute an important cause of irregular production of the industry as a whole, when the point of view taken is that of a period of years. Most people will be surprised to know that "the total time lost by strikes in the bituminous fields of the country from 1899 to 1921 was only 9.8 per cent of the total idle time." [6] "Speaking nationally, there has been no twelve-month period, save possibly 1902–1903 and 1916–1917, when the demand has not been the real limit on output." [7]

Lack of a steady market demand is, therefore, the controlling reason for the irregular production of the bituminous mines. When we analyze this demand, we find that the year's output of the mines is distributed as follows: "28 per cent goes to the railroads, 25 per cent to the boiler houses of factories and mills of all kinds, 15 per cent to the coke ovens and gas plants, 10 per cent to the homes, 7 per cent to steel plants and the same percentage to power plants and street railways, 4 per cent is exported to Canada or overseas, 2 per cent is used at the coal mines for necessary power and the remaining 2 per cent goes to the seaboard for steamship fuel." [8] Consolidating these percentages still further, we discover that manufacturing plants of all kinds fur-

6. Report D, p. 8. 7. Report E, p. 20.

8. Report S (Final Report), pp. 2, 3.

nish 47 per cent of the total demand for soft coal, and railroads and public utilities 35 per cent. To these large consumers we must chiefly look for any such steadying of the demand as will tend to stabilize the business of mining coal.

Before proceeding to discuss what may be done in this direction, it will be well, however, to study more carefully the conditions at the mines which result from irregular operations.

According to figures furnished by the Geological Survey, the bituminous mines lost during the thirty years 1890–1919, on an average, 93 out of a possible 308 working days in the year: 15 of these days were lost through business depression, 34 days through overdevelopment and 44 days through seasonal demand.[9] The Commission, naturally enough perhaps, fastens its attention first on seasonal demand as a prime cause of irregularity of operation. But it is doubtful whether this is the proper method of approach. Seasonal demand, of necessity, determines the seasonal production of some coals, such as the Colorado lignite which will not bear long-distance transportation or storage, and which therefore is used only by near-by domestic consumers and by the sugar-beet factories in the neighborhood whose activities are themselves seasonal.[1] But for the more important soft coals produced in the eastern part of the country, the seasonal demand for coal is, for the most part, merely a habit formed at a time "when the development of the railroads was at least as advanced as that of the coal industry, if not more advanced."[2] Coal furnishes more traffic to the railroads of the country than any other commodity, and to those railroads penetrating the chief coal fields of the country, it has in the past furnished from three fourths to nine tenths of the traffic. At times when there was severe competition among the

9. Report E, p. 20. 1. Ibid., p. 21. 2. Ibid., p. 2.

railroads to secure extra traffic, every encouragement was given by the roads to open new coal mines along their lines or in places where the mines could be reached by branch lines. The Commission has itself shown how this situation resulted in both seasonal consumption of coal and the overdevelopment of mining.

> The fact of irregular demand due to seasonal consumption alone offered incentive for development of soft coal mines in excess of average requirements. If the country called for a maximum tonnage in November, there was a market in November at least for that maximum output, and mines were opened to meet that demand. A decade ago the cost of opening and developing a soft coal mine was small by every comparison with today. Coal land was cheap, little machinery was required and that less expensive. The railroads were anxious for the traffic. The periodic good market in fall and winter offered profits. Development, from keeping pace with the country's growth, however, grew to overdevelopment as other factors were brought into play.[3]

Among these other factors were the mine strikes in the organized fields. These suspensions for a while occurred with considerable regularity just prior to the biennial agreement entered into between the operators and miners in the Central Competitive Coal Field, and were intended to assist the union in its negotiations. As long as the demand for coal remained fairly constant and the capacity of the mines was not greatly in excess of the demand, there was little loss to the miners from such strikes. Production would be speeded up after the strike was over, cars were generally sufficient to dispose of the product when mined, and the result was that the miners had about the same number of working days per year whether they engaged in a strike or not. At the same time, it may be said that these troublesome interruptions of production encouraged the opening of new mines south of the Ohio River in the non-union coal fields, where more favorable wage scales already favored the operators.

3. Report E, p. 2.

Another factor, not mentioned in this connection by the Commission, has also contributed materially to the overdevelopment of coal mining. This is the method used in mining the coal. Generally speaking, other things being equal, the newer mines have the advantage in mining costs over the older mines which are getting their coal farther underground. At times when the price of coal has been high, and especially during the war period, there was a strong incentive furnished to the owner of undeveloped coal lands to begin the development of his coal resources, especially when the coal was so located that stripping operations could be undertaken.

Even before the war there was a tendency to open new mines when there was no apparent need for them; but this tendency was greatly accelerated by the high price of coal prevailing during the war. From 1910 to 1915 about 300 new mines had been opened each year. In the succeeding years the number opened was as follows:

1916	454	1918	1,573
1917	1,285	1919	1,058

As a result of the operation of all these factors and many others of lesser importance, the capacity of our bituminous mines had developed far beyond the needs for this kind of fuel. The year of largest production of bituminous coal was 1918, when the war-time demand had reached its maximum: 579,000,000 tons were produced that year. The peace-time demand has, of late years, been on an average about 450,000,000 tons a year, but the estimated capacity of the mines is now in excess of 800,000,000.[4]

So long as this situation continues, it is a well-nigh hopeless task to attempt to stimulate early buying and

4. Report E, p. 10.

the storage of coal by the large consumers. The loss of interest on capital invested in stored coal, the cost of ground space required for storage, the danger of fire, the extra cost involved in rehandling, the not inconsiderable loss due to deterioration of coal thus stored, all deter the consumer from following the advice to buy early, so long as the capacity of the mines to furnish him coal when needed creates the feeling that his wants for fuel can be supplied at the time it is needed.

The sequence of events resulting in overdevelopment is somewhat as follows. When the demand for coal becomes active, the railroads are unable to furnish all the cars needed and there is much talk of a "car shortage." The rising price of coal causes speculative buying, the opening of new mines, and the reopening of abandoned ones. Labor is attracted into the industry and laborers leave the older mines to engage in the newer operations. The smaller, less well equipped, and badly located mines demand from the railroads their quota of cars based on their potential mine capacity. The railroads are forbidden to discriminate, and as a result the existing car supply is badly distributed. The larger mines, seeing that the only way to get the cars they need is to increase their capacity, do so and thus enter into the general scramble for cars. High prices of coal usually favor the inefficient operators who do not have contracts for delivery, and some shippers with contracts are tempted by the high price of coal to sell on the open market rather than to fill their contracts.

The extent of the overdevelopment may be shown in several ways. In 1890 the estimated capacity of the bituminous mines exceeded the output for that year by 42,000,000 tons. Some excess of capacity is desirable, to provide for production at the peak, since it is not to be expected that production can ever be spread evenly

throughout the year. In 1921, however, the estimated capacity of the mines exceeded the actual production by nearly 420,000,000 tons. The men employed in and about the mines increased from 192,204 in 1890 to 663,754 in 1921, and this, too, in spite of the fact that the increasing use of mining machinery has greatly increased the productive capacity of the individual miner. The burden imposed on the consumer by this overexpansion is seen in the fact that the coal which in 1890 sold at the mines for 99 cents a ton sold in 1921 at $2.89 a ton.[5]

Some of the large consumers of coal among the railroads, the public utilities, and the iron and steel industries, have added to the general confusion by purchasing coal lands and opening mines of their own. In this way they hoped to stabilize their own fuel supply. Their action under the circumstances was excusable, and in the long run may be a desirable thing to encourage; for the more steady demand for coal furnished to these "captive mines" enabled them to continue operation for more days in the year during 1920 and 1921 than the commercial mines.[6] But since these mines were rated according to their capacity, just as other mines were, they too were tempted to increase the mine capacity in order to get cars, and the result was that not even these captive mines have been able to enjoy continuous operation.

The railroads, arguing that, in case they could not get the cars needed for their own use, they could not transport coal needed by other consumers, sought a solution of their own problem by the device known as the "assigned car." Mine operators willing to accept the railroads' price for railway fuel — a price always much below the prices offered to other consumers — were guaranteed a full quota of cars in which to load

5. Report E, p. 10. 6. Ibid., p. 23.

railway coal. Such an arrangement enabled the mine producing railway fuel to work every day that the men desired to work. To both the operator and the railroad entering into such an arrangement there were obvious advantages in the plan. But other mines found increasing embarrassment as the number of assigned cars increased, all of them being taken out of the supply otherwise available for general distribution. The results of this method of distribution are shown by the experience of the Pennsylvania Railroad. During 1920 the commercial mines along this road received only 50 out of every 100 cars ordered, while the mines getting assigned cars had a full supply. By January and February 1923, two thirds of the coal cars on this road were assigned, and in the latter month commercial operators received only 18 cars out of every 100 ordered. The unfairness of the use of assigned cars has been recognized by the Interstate Commerce Commission, which has ordered the discontinuance of the practice.[6a]

The overexpansion of the bituminous industry has wrought havoc to several coal-producing districts whose mines have not nearly approached exhaustion. The Pittsburgh field, which in 1890 produced 36 per cent of the coal supplied by the Appalachian region to the West and Northwest, now produces only 25 per cent. Southern Ohio, which in 1890 had about 14 per cent of this trade, now has between 2 and 3 per cent. In the meantime, the West Virginia, Kentucky, and other nonunion fields south of the Ohio River have entered this market and have greatly expanded their production. These relative gains and losses are in part the outcome of normal competition — the displacement of an inferior commodity by a superior one or the survival of an efficiently managed mine in competition with less efficient

6a. Report E, p. 8.

ones. In part, however, the struggle has been of a different character. Union working conditions and standards of living have succumbed to non-union standards, and unfair differentials in freight rates have played their part in the competition for markets.[7]

From a social standpoint the worst consequence of this overexpansion of bituminous coal mining has been the effect on labor. When we stop to realize that the demand for coal has been for the last decade only sufficient to keep about 411,600 men employed for 290 days a year in and about the bituminous mines, while the plan of spasmodic mine operation had drawn more than 660,000 men into the mines in 1921 who succeeded in finding work for only 149 days, on an average, we can see that we have a situation bound to breed suffering and discontent and one for which the country at large cannot disclaim responsibility. It may be said that the year 1921 was a year of unemployment; but even in 1920, a year much above the average in steadiness of mine operation, the 635,000 bituminous miners were idle for 88 days, on an average, not counting Sundays and legal holidays. To speak of the number of days lost by the *average* miner tends to conceal, however, the really serious phase of the problem. In the prosperous year of 1920, 16 per cent of the bituminous miners found employment at the mines for less than 160 days, a little more than half the full working time. During the bad year, 1921, more than one half the miners were idle approximately half the time.[8]

To find a remedy for such a serious situation is not easy. To pursue a let-alone policy — let competition eliminate the least capable mines — not only has failed to bring relief in the past, but, in view of the abundance of undeveloped coal lands, offers no hope for many

7. Report E, p. 12. 8. Ibid., p. 16.

years to come. "There has been," says the Commission, "nothing in the history of the bituminous coal industry to discourage overdevelopment save the losses sustained in the competitive fight for business. The lack of concentration of ownership of the soft-coal mines, — there are three mines for every two operating owners, — coupled with this overdevelopment, has resulted not in the permanent closing of some of the mines but in the operation of all more or less intermittently even in the dullest periods." [9]

Government ownership and operation, the favorite panacea of many reformers, appears especially impracticable as applied to the bituminous mines, largely for the reason just mentioned. Even if one does not hesitate to urge the Government to assume the enormous financial and administrative burden of securing control of the more than 9000 soft coal mines and operating them in such a way as to care for the interests of all concerned, there still remains the larger problem, how shall we deal with the owners of undeveloped coal lands with their highly speculative values?

The Coal Commission offers no radical solution of the problem of overdevelopment, and its very failure to do so probably accounts in large part for the absence of any widespread discussion in the public press of its findings and recommendations. It does think, however, that it has found a clue to the situation in the close relationship which exists between bituminous coal-mining and railway transportation, and believes that the powers possessed by the Federal Government to regulate commerce between the States offer a means whereby the Interstate Commerce Commission, the agency provided to regulate the railroads, can use its powers to help stabilize the production of coal.

9. Report E, p. 29.

The first suggestion made is that the Interstate Commerce Commission take steps to see that in the future the railroads rate the mines for purposes of car-distribution principally on the basis of their commercial ability to sell coal rather than on physical capacity to produce it. Some of the roads had, prior to the war period, given consideration to commercial ability as well as to physical capacity, in some instances giving equal weight to both factors. But during and since the war commercial rating was abandoned, chiefly no doubt because the active demand for coal left little doubt that there was a market for all the coal that could be produced and transported.[1] The proposed change in the method of distribution of coal cars would favor the operator who accepts long-time contracts. He is usually the large producer, and statistics are presented to show that "the larger the mine the steadier its operation"; and this holds true in years of depression as well as in years of heavy demand.[2]

Some of the gains which the Commission asserts would flow from this new method of car-distribution would be as follows:

1. It would furnish an incentive to the producer to operate during dull seasons and thus help to distribute the transportation load throughout the year.

2. It would give the consumer an incentive to buy in dull seasons. Presumably there would have to be some concession in price to encourage him in this, tho there would also be the certainty of having the coal when it was needed.

3. It would remove the incentive to secure preference in the use of transportation services, such as the use of assigned cars.

4. It would reduce the danger of car shortage by evening demand and production.

1. Report E, p. 8.

2. Ibid., pp. 17, 18.

5. It would tend to reduce the opening of "snow-bird" mines, that is, those operating only when prices are high.

6. By increasing the opportunity for regular production, it would reduce the cost of production and thus benefit both consumers and producers. Moderate profits throughout the year would tend to take the place of speculative profits with intermittent operation.

Altho commercial rating would stimulate long-time contracts between buyer and seller, the Commission would not recommend that car ratings be based on such contracts, but rather on the basis of coal actually shipped "during the last protracted period of car surplus, whether the shipment were on long-time or short-time contract, or spot sales." Such a system of rating would not discriminate against any producer, large or small, for each would have an equal opportunity to take advantage of the system. Neither would it do away with the private coal car, whose owner should be permitted to use it continuously throughout the year. It should be added that the Commission thinks that the adoption of the system may require some modifications in the Transportation Act.

An incidental evil of the present system of mine-rating, which would be done away with by the new system, is the so-called development rating. A new mine in its developmental stage has been given a preferential car supply of three cars per shift for two shifts per day. Such mines were favored in this way even when cars were denied to going commercial mines. As a result, "it has not infrequently happened that small operations that were never intended to be developed into real mines were given more cars than well-organized properties, immediately adjacent, of many times the capacity, were allotted from the distributive share." [3]

3. Report E, p. 34.

Another suggestion made by the Coal Commission, with a view to checking the overexpansion of the coal industry, is the readjustment of freight rates so as to avoid unnecessary long hauls. The same kind of railway competition which has encouraged the opening of new mines has also led the competitive carriers to make such rates on long hauls as should enable mines at a distance to compete with mines adjacent to, or not far from, large markets. Much of the soft coal is now being sent long distances to market, sometimes passing across other coal fields which produce coal of a similar character. Mining companies are inclined to demand of the roads that they make rates which open up new markets to these companies, even when these markets are already being supplied with coal from mines nearer at hand. These rates do not reflect the real differences in cost of transportation, and they impose on a scanty car supply burdens which cannot be borne. The Commission does not favor such an artificial zoning of coal shipments as had to be adopted during the war, for this unduly restricted the market and the consumer's choice of coal. Neither does it ask for a rapid readjustment of a rate structure which has been built up in the course of half a century. Gradually, however, rates should be so readjusted as to make them conform more nearly to the cost of service.

There can be little objection to the plan proposed by the Coal Commission to use the power possessed by the railroads to discourage the opening of new mines. If carried out in vigorous fashion by a special division of the Interstate Commerce Commission entrusted with the task of regulating the relations between the railroads and the coal mines, there is a possibility that much good could be accomplished. But to one who has been made to see, not only by the reports of the Commission,

but by the reports of various Congressional committees which have been called upon to investigate the coal problem in recent years, that the troubles in the coal industry are closely associated with and dependent on overexpansion, these remedies suggested by the Commission seem very feeble in comparison to the magnitude of the problem involved.

It is true that the Commission does not stop here. Other remedies are suggested. Some, like the storage of coal by the railroads, public utilities, and large manufacturing plants, and even by the householder, can be encouraged by the coal industry itself through a policy of low prices offered during the dull season, and by educating customers as to the best methods of storage to lessen deterioration.[4] Local communities are urged to try to secure the distribution of coal in such a way as to prevent extortionate profits to dealers through licensing retail coal dealers, organizing coöperative selling associations, or establishing municipal coal yards. The Federal Government may collect further facts relating to the coal industry in order to instruct the public and to guide administrative authorities and Congress in dealing with the problem. It can do much to encourage the transportation of coal by water by preventing unfair competition on the part of the railroads. It can exercise care in leasing the coal lands on the public domain so as not to permit the opening of new mines except on a showing before the Interstate Commerce Commission that such mines would serve the public interest. It can encourage the consolidation or pooling of bituminous mines with a view to limiting the operation of the mines to the low-cost ones when the demand for coal is normal. Existing legal barriers to such consolidation should be removed.

4. Report K.

All these proposals, worthy of consideration as they are, seem insufficient. In its Final Report the Commission does hint at the use of a power which could be made an effective obstacle to further unnecessary expansion through the opening of new mines, altho it nowhere comes forward with a clear-cut recommendation that this power be exercised. The Report says:

> It is through the granting and withholding of transportation service through supervision that an equilibrium can be established between demand and output. The Interstate Commerce Commission under the existing law already has the responsibility for authorizing a railroad to put in sidings and to furnish cars and transportation. The information collected as above proposed should be utilized as a basis for determining whether at a given point and at a given time the public convenience and necessity do or do not demand further coal supplies.[5]

Repeatedly in its reports the Commission emphasizes the fact that the mining of coal is a business clothed with a public interest and therefore one justifying and requiring government supervision and regulation. It, furthermore, constantly calls attention to the similarity in the situation of the coal industry and that of railway transportation, both being of an interstate character and therefore calling for Federal rather than state regulation. It further believes that the connection between the mining and the transportation of coal is so close that the same body that is entrusted with the regulation of the railroads should also be the one that supervises and regulates the mining of coal, and therefore favors the creation of a special division of the Interstate Commerce Commission for handling this problem.

Now it is well known that in the work of regulating our railways we have slowly passed from the attempt to solve the problem by enforcing competition to that of restricting competition and even in some cases forbid-

5. Report S, p. 7.

ding it. Railways may no longer be built merely because a group of speculators, beholding the prosperity which has come to a certain railroad, decide to enter the same field and force a division of the traffic. The public necessity for a new transportation route must be proved to the satisfaction of the regulating body before it can be built. This no doubt is a great limitation on the freedom of the private citizen to engage in an industrial enterprise and employ his capital in the way which he thinks is likely to yield him the largest profits. But his private pecuniary interest has had to give way to the larger social interest.

It would therefore seem a logical step on the part of Congress to indicate by the necessary legislation or resolution that the Interstate Commerce Commission is expected to utilize fully the power to refuse to allow the building of new railway lines or sidings to mines which are about to be opened, until the owners of these mines have proved to the satisfaction of the Commission that there is a demand for coal from these mines which cannot well be met at reasonable prices by mines already in operation. Such a policy, pursued steadily and consistently, would within a few years permit the nation's demand for coal to catch up with the potential supply from existing mines. It would stabilize the production and price of coal and would at the same time solve the problem of irregular employment in and about the soft-coal mines.

III

The problems presented by the anthracite coal industry are, by comparison with those of the bituminous region, of minor importance. Anthracite coal is mined almost exclusively with the market for household fuel in mind. Only those sizes — buckwheat, rice, and barley —

which are too small for household consumption and whose production is incidental to that of the larger sizes, are used for industrial purposes.

The demand for the household sizes is far in advance of the present capacity of the mines, and the market for anthracite coal is therefore a fairly steady one. If the householders in the eastern states would buy their winter's supply more largely during the spring and summer months, an even more steady market and output would result. As a consequence of the steadier demand for anthracite and of the concentrated control of production by the big companies, irregularity of operations, which is the fundamental evil of the bituminous industry, is not a factor of large importance. This has not always been so. From 1890 to 1895 the average days worked each year by the anthracite mines hovered around 200. From 1896 to 1900, the average was only 165 days. During the following decade it was not far from 190 days. Since 1910, however, the average number of days worked each year has never been less than 230, and of late years the average has been nearer 270 days.[6] The year 1918 may be said to have been a year of full-time production, for with the numerous holidays observed by the anthracite miners and the days when the breakers could not operate on account of mine disability, a year of 293 days, which was the record of 1918, is as much as can reasonably be expected.

Car shortage is practically unknown in the anthracite region, because of the steadiness of mine output and the community of interests between the mining and the transportation companies. Such interruptions of production, not purely local in character, as have occurred within recent years, were due to strikes, the most serious of which occurred in 1902, 1912, 1920, and 1922.

6. Report on the Anthracite Industry, p. 18.

Labor troubles in the anthracite fields are serious enough, and, as just indicated, play their part in creating difficulties for the consumers of coal. But they are of less serious import than in the bituminous fields, because the anthracite miners are 100 per cent organized for collective bargaining. The strong United Mine Workers stand on a somewhat equal footing with the equally well-organized coal operators when they come to negotiate a new wage agreement. Furthermore, the Anthracite Coal Commission of 1902 left a plan of conciliation which has proved a fairly effective method of solving any but the most serious controversies between the anthracite miners and their employers.

The fundamental evil and the great unsolved problem of the anthracite industry is that of monopoly. Monopoly in this as in so many other instances is not wholly evil. It is largely responsible for the more regular operations of the mines, because it can regulate output in accordance with need. It has undoubtedly been a force operating in favor of the conservation of a fuel whose present supply is far short of consumers' demands and whose final exhaustion is an event which can be foretold with a high degree of accuracy. It has exerted a stabilizing influence on the price of coal and has certainly not taken full advantage of its monopolistic powers to extort from consumers "all that the traffic will bear." In fact the highest prices charged in recent years have been charged, not by the companies sharing in the monopoly, but by the independents, who produce not to exceed 24 per cent of the entire output and whose mine prices constitute a larger percentage of the prices paid by consumers in the large cities than do the so-called "company prices." [7] As the Commission says: "Doubtless, both business sense and regard for public

7. Report on the Anthracite Industry, p. 3.

opinion have led those strong companies to acquiesce in the noticeable differential between their own prices and the higher prices of the independents." [8]

The high prices of the independents are due in part to the actually higher costs of operation of their mines and in part to the royalties which they pay to the owners of the lands leased by them.

> Among the independent operators the great bulk of the output — at least 70 per cent — is produced from leaseholds under royalty. Among the "railroad companies" the great bulk of the output is produced from lands in fee. Royalties are therefore not an important item in the cost of producing "company" coal. They are an important element in the cost of producing "independent" coal.[9]

Protected by these higher-cost independent mines, the company mines, producing 76 per cent of the total output and controlling 90 per cent of the underground reserve of coal, have only to sit back and enjoy the profits which come from their more favorable position. There is no effective competition between the "railroad" companies, for practically uniform prices are charged by them. If there is a dull market for coal, the prices charged by retailers reflect the circular prices of the companies; but since the total output of the anthracite mines is less for the entire season than the normal demands of consumers, dealers must soon supplement their purchasers of "company" coal at circular prices with high-cost coal produced by the independents. This results in either "widely different prices to different consumers for coal of similar quality, or in the equally vexatious advance in price to the same consumer later in the season if the dealer has to supplement his allotment of 'company' coal with some 'independent' coal." [1]

Repeated efforts have been made by legislation or court decree to destroy the anthracite monopoly, but

8. Report on the Anthracite Industry, p. 38.
9. Ibid., p. 32.
1. Ibid., p. 31.

little more has been accomplished than to change the form of the combination. The real monopolistic character of the industry is that furnished by nature herself, the concentration of limited supplies of a much-desired fuel within a narrow area. Had the effect of allowing the control of these valuable coal lands to pass into the hands of private owners been foreseen a century or more ago, it might have been desirable to keep the control of these mineral resources in the hands of the nation or the state. But that solution of the problem is no longer available. To purchase the coal lands on the basis of their existing monopoly values would bring little benefit to the consumer of hard coal. To seize the coal lands and pay for them on the basis of their original value, with accrued interest charges, less the amounts which their owners have already secured from the sale of the product — a remedy which has been proposed by some of the miners' representatives — has no precedent in our treatment of private property rights and is hardly likely to secure the approval of the American public.

The Commission does propose as a partial remedy for the monopolistic situation in the anthracite region a method by which the government might share in the monopoly gains.

This is the levy of a graded tax on royalties and differential profits. This would not lower the price of coal, but it would secure a public revenue without increasing the price of coal. The present sales tax imposed by the State of Pennsylvania on anthracite gives no such protection, even tho it yields some $7,000,000 to the State. Since it is a percentage on the f. o. b. mine price, it falls on the marginal high-cost producer, as on others, and even more heavily when he is selling at a higher price, and is therefore passed on to the consumer in the form of still higher prices. An excess profits tax, as suggested above, under these monopolistic conditions, would not be added to the price of coal, and would not be passed along to the consumer, as it would fall only on those who have differential advantages.[2]

2. Report S, p. 7.

This suggestion seems a good one and is in keeping with a scheme of taxation already adopted by our Federal Government. It would not benefit the consumer as consumer, but would be to his advantage as tax-payer and would be generally believed to be in accordance with the tax principle of ability to pay.

The Commission insists that the main remedy which the consumer of hard coal has against high prices is one which it is within his own power to apply. The amount of anthracite produced is already insufficient to satisfy the needs of householders who have been in the habit of relying on this kind of coal, and the deficiency will be more marked as the years pass. Not only is there an increase in the number of people who would gladly consume anthracite coal, but the output of coal per man in the anthracite region is now declining, and for the past ten years has been practically stationary. Thinner seams are being worked; and the northern coal field, which yields 70 per cent of the domestic sizes of anthracite, is being exhausted at a more rapid rate than is the southern field, where the mines yield only 53 per cent of domestic sizes. And it is from the southern field that the future supply of domestic anthracite must chiefly come.[3] Whether he wills it or not, the householder must turn to the use of substitutes.

Among these substitutes there are the smaller sizes of anthracite — now used only for steam purposes — which can be used in specially designed furnaces, or in present furnaces if used in the form of briquettes or mixed with the larger sizes. Coke, specially prepared for domestic use, is another practicable substitute. Manufactured gas and fuel oil are possibilities, but at the present cost of production cannot be sold at prices which the average householder considers reasonable.

3. Report on the Anthracite Industry, pp. 39, 40.

Finally, there is the bituminous coal, used almost exclusively as domestic fuel in the greater part of the country, but which the householder in the east looks upon as a desperate last resort. As its use becomes more general, however, the bituminous mines in the regions adjacent to the anthracite-consuming territory will prepare their coal in sizes suitable for household use.[4] Education in the use of these coals, especially in the firing of furnaces, will lessen some of the inconveniences of their use.

IV

Little space is left in which to deal with the subject of labor relations in coal mining, to a consideration of which the Commission devotes several bulky reports. For an adequate summary of them at least as much space would be needed as is taken by this article as a whole. As a poor substitute for such a treatment of the subject, I shall limit myself to a brief discussion of the Commission's attitude on the question of the extension of unionization to the non-union fields.

The facts regarding unionization are briefly these. There are in the bituminous fields approximately 585,000 [5] miners, including workers above as well as below ground. About three fifths of this number, or approximately 400,000, are members of the United Mine Workers of America, which also includes in its membership practically all the workers in the anthracite fields, who number about 150,000. It is a union of the industrial rather than the craft-union type; in the number of members and in many other respects it constitutes the most powerful labor organization in America today. In its ranks are to be found representatives of practically every race and nationality working in the industry.

4. Report on the Anthracite Industry, p. 42.

5. Report R, p. 2 (figures as reported for the U. S. Census of 1920).

This means that its internal dissensions are many and the problem of control by union officials an extremely difficult one. In its efforts to extend its power it has used persuasive measures wherever possible.[6] When these have not succeeded, officers of the local unions [7] have, at times, employed intimidation and force.

The public is well aware of the fact that some of the most notorious cases of the use of violence in connection with labor disputes in this country are associated with the effort of the United Mine Workers to force its way into non-union fields, or to prevent operators who have had agreements with the union from cancelling these agreements and operating their mines with non-union labor.

In spite of these outbursts of violence, which the national officers have not often sternly rebuked (tho generally denying that the organization is responsible for them), and in spite of the strong radical tendencies of many of its members, the United Mine Workers has on the whole pursued a conservative trade-union policy, and has made collective bargaining its chief aim. In nearly every instance it has used the powerful forces wielded by the national officers in behalf of the maintenance and enforcement of the agreements entered into with the operators.[8]

As to the value of the organization in improving the living conditions of the miners, the Commission itself testifies in the following words: "The history of the past thirty years affords conclusive evidence that the United Mine Workers of America has been the potent

6. Report D, "Labor Relations in the Bituminous Industry," pp. 38, 39.

7. Ibid., "The Commission does not find, notwithstanding many unfortunate occurrences, unlawful acts, and unwise statements, that it is or has been the ultimate object of the officials of the United Mine Workers of America to unionize all the mines by force if necessary." Report A, "Causes which from time to time induce strikes," etc., p. 1.

8. Ibid., p. 19.

agency in the betterment of the miners' working and living conditions, and it is necessary today for the protection of the standards that have been attained." [9]

One might naturally suppose that the Commission would urge the public to throw its influence in favor of the extension of the sphere of influence of this "potent agency in the betterment of the miners' working and living conditions," in spite of any of its defects as an organization or any limitations on the possibilities for still greater accomplishments which it might possess. But the Commission does not do this. Instead, it warns the union that it must accept as the end to be striven for, not improvement in the condition of its members, but

> service to the public under conditions fair alike to employer and employee. . . . If it were clear that this end could best be advanced by the complete unionization of all the mines, we believe the public would favor it and we would not hesitate to recommend it. If deunionization gave promise of best accomplishing the goal, we would be ready to recommend that. But we do not find convincing evidence that followers of either complete unionization or complete deunionization have demonstrated such desire and capacity to heed the public's goal as to warrant our recommending that the public's weight be thrown back of either policy.[1]

The tragedy involved in this neutral attitude is that it stands in the way of a solution of a much more fundamental problem — that of irregularity of operations of the mines and the consequent unemployment of the miners. The Commission itself has left no doubt as to the close connection which exists between irregularity of work and the overdevelopment of the mines,[2] and it is in the non-union fields that the overdevelopment chiefly

9. Report S (Final Report), p. 12.

1. Report D, p. 2.

2. "The most important factor responsible for lost time is the overdevelopment of the industry. The Commission has already stated that there are too many mines and too many miners." Ibid., p. 23.

takes place. How the non-union operator takes advantage of a period of depression to secure the trade of his competitors who are operating union mines is shown in the following extract from the Commission's report:

> There is a marked tendency in many non-union fields to cut rates below the union scale in bad times, and as a consequence to operate more steadily. In times of prosperity, scarcity of labor, and possibility of unionization, the rates tend to come up to the union standard, especially in the fields where the threat of unionization is imminent. There are many operators, however, in the more remote fields, and a few in the fields where unionism is imminent, who do not bring rates up in prosperous years. One non-union operator, speaking of this type of operator, put it: "The real irritant is the man who cuts rates in lean years and forgets to raise them again in fat years." . . . Fluctuation in non-union rates tends to make business swing back and forth between union and non-union fields, going to non-union fields entirely at the time of national strikes when they alone supply the market. By cuts in wage-rates, the non-union operator takes business from his union competitor in times of depression. By advances to check the spread of unionism or in response to the need of holding workers, he increases the demands made by the union upon the union operator.[3]

It is not their strong desire to promote the interest of the public, nor even their abhorrence of union methods, which causes the operators in the non-union fields to refuse to allow the unionization of their mines. It is because they do not care to surrender the differential advantage which they now have over the operators in union fields in the way of lower wage-rates, longer hours, and fewer restrictions on working conditions, that they decline to sign agreements with the union. On the other hand, it is not because the union prefers the methods of intimidation and force rather than that of peaceful persuasion that we find violence an accompaniment of the efforts to unionize the mines south of the Ohio.

The Commission itself in forceful language recounts

3. Report D, p. 28.

the methods by which the operators have prevented union organizers from carrying on the work of peaceful persuasion in non-union fields. Pressure brought to bear on the state and local authorities to deny the rights of free speech, free assembly, and free movement from place to place; leases written with clauses forbidding the tenants to admit anyone without the consent of the company, and evictions when these prohibitions are disregarded; employment of mine guards of questionable character, whom the local sheriffs are bribed to swear in as local deputies; orders, strictly obeyed, given by these powerful mining corporations to public officials to keep union organizers out of the villages owned by the mining companies; a widespread spy system which penetrates to the very heart of the miners' organization, making it impossible for a miner to know whether his neighbor or even the officials of his local organization are loyal to his interests or are in the secret pay of the operator; the use by the mining company of the "individual" or so-called "yellow-dog" contract, whereby the worker is required to declare that he is not a member of the United Mine Workers of America and that he will not join this organization or encourage anyone else to do so while he is in the employ of the company — all these methods and more are used by the mining companies to prevent the unionization of their mines.[4]

This "irrepressible conflict," as the Commission very well calls it, over the question of unionization, has now reached the stage aptly illustrated by Lincoln's famous statement that the country cannot exist "half-free and half-slave." In view of the steady increase in the number and extent of operations in the non-union fields and in view of the increasing irregularity of operations in the fields already organized, the question seems pertinent

4. Report D, p. 38; Report A, pp. 4–8.

whether under such conditions the operators in union fields can continue to sign agreements with the union and undertake to operate under union scales and working conditions. If not, what then is to be the situation? Is the fight for markets in this highly overdeveloped bituminous industry to take the form of forcing the miners, no longer enjoying the protection of their organization, to accept the wages and conditions of living which existed in the mining camps before the union was formed?

Altho the evidence cannot here even be summarized, the Commission has left no doubt as to its own belief in the superiority of living conditions in the communities where the United Mine Workers is strongly entrenched over the conditions which *generally* prevail in the unorganized territory; [5] and we have already quoted the statement in its Final Report that the "potent agency" in creating these better conditions is the United Mine Workers of America. In view of this fact, when the Commission fails to ask the public to throw its support in behalf of the unionization of the non-union fields, why has it not given us a statement as to what the alternative will be?

It is true, of course, that complete unionization would bring new problems to be solved. The public has no more confidence in the benevolent intentions of a labor monopoly in the coal fields than it has in the present monopoly of the coal owners in the anthracite fields. Public supervision and regulation of labor monopolies is just as necessary and just as much a thing of the future as is the public regulation of capitalistic combinations. In many respects this public supervision will be facilitated when a strong organization of the coal-mine owners is brought face to face with a centralized control of the labor supply.

5. Report R, "The Bituminous Workers and their Homes."

V

The Reports of the United States Coal Commission possess high educational value. Perhaps not many new or startling facts are revealed, not already known to the students who had read the reports of the several Congressional investigating committees that took testimony on various phases of the coal situation during the years 1919–1922. But such readers are few, and there is certainly no other place where so much information in regard to the coal situation, as it exists in the United States today, can be found as in the voluminous reports prepared for the Coal Commission by its staff of investigators and secretaries. It is an unusually aggravating piece of Congressional stupidity that no funds have been provided for giving publicity to the results of an inquiry which Congress itself had authorized and for which it had appropriated $600,000. It is to be hoped that this failure to provide for the publication of the Commission's findings will not be permanent, even tho much of the gain to be expected from publication while the subject was still fresh in the public mind has already been lost.

The Commission's own recommendations for solving the problems revealed by the investigation are bound to be disappointing to the man who had hoped to find guidance from men so well equipped to digest the work of their expert investigators as are the distinguished gentlemen who constituted the membership of the Commission. Their recommendations appear to have been unanimous; and perhaps in that very fact lies their weakness. It may explain why Congress has taken no steps to give effect to them and why no pressure seems to be brought to bear by the operators, by miners, by

newspapers, or by coal consumers on Congress to deal with the situation in the ways recommended by the Commission.

The coal situation in the United States is a serious if not a critical one. The solution of the major problems necessitates that some radical steps be taken to give sufficient power to governmental agencies capable of control. The Commission is positive in its statements that "coal mines directly essential to the operation of businesses that are universally recognized as clothed with a public interest" are themselves "affected with a public interest." [6] Only the Federal Government possesses the necessary powers to supervise and regulate these public utilities whose product constitutes such an essential element to the carrying on of interstate commerce.

It was not to be expected that in the way in which this control is to be exercised there would be a unanimous agreement among the Commissioners, whose training and experience and whose traditional points of view are so different from one another. Nor was it necessary that the recommendations from such a body should be unanimous in order to carry weight with the public. What was to be expected was that the several and diverse points of view represented on the Commission should be fairly and positively stated, together with the reasons which led their proponents to believe that the evidence collected justified such solutions as were proposed. These several proposals would then form the subject of debate both in and out of Congress, until one or more of them had obtained such support as to warrant the legislation necessary to try the experiment.

That there were such differences of opinion among the members of the United States Coal Commission is not

6. Report S, p. 3.

to be doubted. One of the members, at least, has stated that some of the Commissioners were ready to go much further in the way of positive recommendations as to the kinds of remedies to be applied, but that they withheld such proposals in order that there might be unanimity in regard to what was recommended. But in such a matter unanimity is to be obtained only for measures which are cautious and compromising, and therefore ineffective. There is no difficulty in getting men to agree on the need of "a better public understanding of the coal business," and, therefore, in recommending that "Congress make definite provision on a permanent basis for continuing the collection of coal facts"; on recommending the encouragement of water transportation of coal and the control of unfair competition on the part of the railroads; on the need of a better utilization of the available car supply and motive power; on the need for the establishment of an agency by the Federal Government to continue studies of unemployment; on the need of having local communities take steps to secure more efficient coal distribution to consumers; and finally on warning the coal industry that the largest responsibility rests upon it for seeing that its house is put in order and that it makes effective service to the public rather than profits the primary aim of management. Are we not warranted in saying: in all these things have we believed from our youth up; what more must we do to be saved?

We do not mean to sneer at the recommendations of the Coal Commission just enumerated, or other recommendations not herein specifically mentioned. Many, if not all, of them are an essential part of any effective scheme of public control of the coal-mining industry. Our complaint is rather that the remedies suggested are so palpably inadequate for the curing of the

malady. The one suggestion made which goes nearest to the root of the matter is that of placing the regulation of the coal industry in the hands of the Interstate Commerce Commission as a natural sequence to the finding that coal mining and transportation are inextricably bound together. But, as already stated, the Coal Commission appears to hesitate to recommend such a degree of control as will make this regulation effective.

From the present outlook, nothing at all is likely to result from the Coal Commission's recommendations. When the situation in the bituminous fields once more becomes desperate, either the slow process of consolidation and integration will finally bring a solution much pregnant with danger in the chaotic situation now existing in the bituminous industry, — as it has already come about in the anthracite field, — or some plan of public regulation more far-reaching than that proposed by the late Coal Commission will be suggested and carried through by bolder spirits.

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SOME FALLACIES IN THE INTERPRETATION OF SOCIAL COST

SUMMARY

Arguments for social interference developed by Pigou and Graham illustrate common misinterpretations of the meaning of cost and its variation with output, 582. — I. The private owner of a natural opportunity secures maximum return from it by charging that rent which halts the application of investment at the point which is socially most advantageous, 584. — II. The notion of decreasing cost is a fallacy; competitive price fixation under decreasing cost or increasing returns an impossible situation, 592. — III. The law of comparative advantage in international trade is fundamentally sound, 599. — Importation a method of using resources to produce the imported good, and will be employed under competitive conditions only when more efficient than a direct method, 603. — The competitive system has important defects, but they lie outside the mechanical theory of exchange relations, 605.

In two recent articles in this Journal,[1] Professor F. D. Graham of Princeton University has developed an ingenious argument to prove that the classical theory of comparative cost as a demonstration of the economic advantage of trade between nations is "all wrong." He contends that a protective tariff may, after all, be a wise national policy in that it may enable the nation which adopts it to secure a larger product from its resources than would be secured if free trade were permitted. It is the opinion of the present writer, and the contention of this paper, that it is Professor Graham's argument which is fallacious, tho the way in which the classical theory has been formulated in many instances leaves much to be desired. The matter is of the greater importance because the most important argument, from the standpoint of general theory, in Professor A. C.

1. February 1923, November 1923.

Pigou's monumental work on *The Economics of Welfare* [2] is, as I shall also try to show, marred by the same, or a very similar, fallacy.

If economic theory is interpreted as a critique of the competitive system of organization, its first and most general problem is that of determining whether the fundamental tendencies of free contractual relations under competitive control lead to the maximum production of value as measured in price terms. The problems of the validity of the price measure of "real value," and of the distribution of the value produced, are larger but subsequent problems, and belong to ethics as much as to economics; while the detailed comparison of the theoretical tendencies of perfect competition with the facts of any actual competitive society lie in the field of applied economics rather than that of theory. The theory of international or inter-regional trade is a special case under the more general problem, whether "society" can increase the production of exchange value by interfering with free bargaining relations: the case, namely, of bargains between its own members and members of some other society possessing a distinct body of productive resources. The peculiarity of international trade as compared with domestic lies in the immobility of population viewed as labor power. Natural resources are immobile even within a country, and capital goods enter into international commerce in the same way as goods ready for consumption.

2. The Macmillan Co., 1918. This paper was written and submitted to the editor of the Quarterly Journal before the appearance of the March number of the Economic Journal. In that number, Professor D. H. Robertson has an article covering some of the same ground and treating it with his usual analytic penetration and stylistic brilliancy. Moreover, in a rejoinder appended to that article, Professor Pigou admits the particular error in his analysis and states that it is to be eradicated in a forthcoming revised edition of his book. It seems inadvisable to recast and enlarge the present paper so as to include a discussion of Professor Robertson's argument, which is notably divergent from that presented herewith. I trust it will not be thought presumptuous to print without change the few pages which in some sense cover ground already covered by Professor Robertson.

Both Professor Graham and Professor Pigou reason to the conclusion that freedom of trade between regions may reduce the production of wealth in one or even both; and Professor Pigou extends essentially the same logic to cover the relations between different industries, irrespective of regional separation. The contention is that individual profit-seeking leads to an excessive investment of resources in industries of increasing cost (decreasing returns), part of which would yield more product if transferred by social action in some form to industries of constant or decreasing cost. The fallacy to be exposed is a misinterpretation of the relation between social cost and *entrepreneur's* cost. It will be convenient to take up first Professor Pigou's argument, which presents the more general problem.

I

In Professor Pigou's study the argument that free enterprise leads to excessive investment in industries having relatively upward-sloping cost curves is developed with the aid of a concrete example, the case of two roads.[3] Suppose that between two points there are two highways, one of which is broad enough to accommodate without crowding all the traffic which may care to use it, but is poorly graded and surfaced, while the other is a much better road but narrow and quite limited in capacity.[4] If a large number of trucks operate between the two termini and are free to chose either of the

3. Economics of Welfare, p. 194.

4. For simplicity, no account is taken of costs involved in *constructing* the two roads. The aim is to study the effects of the two types of "cost" — that which represents a consumption of productive power which might have been put to some other use, and pure rent or the payment for situation and opportunity. The assumption adopted is the simplest way of making the separation. The conclusion will not be changed if various types of cost are taken into account, so long as one of the roads has a definite situation advantage while the investment in the other can be repeated to any desirable extent with equivalent results in other locations.

two routes, they will tend to distribute themselves between the roads in such proportions that the cost per unit of transportation, or effective result per unit of investment, will be the same for every truck on both routes. As more trucks use the narrower and better road, congestion develops, until at a certain point it becomes equally profitable to use the broader but poorer highway. The congestion and interference resulting from the addition of any particular truck to the stream of traffic on the narrow but good road affects in the same way the cost and output of all the trucks using that road. It is evident that if, after equilibrium is established, a few trucks should be arbitrarily transferred to the broad road, the reduction in cost, or increase in output, to those remaining on the narrow road would be a clear gain to the traffic as a whole. The trucks so transferred would incur no loss, for any one of them on the narrow road is a marginal truck, subject to the same relation between cost and output as any truck using the broad road. Yet whenever there is a difference in the cost, to an additional truck, of using the two roads, the driver of any truck has an incentive to use the narrow road, until the advantage is reduced to zero for all the trucks. Thus, as the author contends, individual freedom results in a bad distribution of investment between industries of constant and industries of increasing cost.

In such a case social interference seems to be clearly justified. If the government should levy a small tax on each truck using the narrow road, the tax would be considered by the trucker as an element in his cost, and would cause the number of trucks on the narrow road to be reduced to the point where the *ordinary cost, plus the tax,* became equal to the cost on the broad road, assumed to be left tax free. The tax could be so adjusted that the number of trucks on the narrow road would be

such as to secure the maximum efficiency in the use of the two roads taken together. The revenue obtained from such a tax would be a clear gain to the society, since no individual truck would incur higher costs than if no tax had been levied.

It is implied that the same argument holds good over the whole field of investment wherever investment is free to choose between uses subject to cost curves of different slope. Take, for example, two farms, one of superior quality, the other marginal or free land. Would not labor and capital go to the better farm, until the product per man became equal to the product to be obtained from the marginal land? If so, it is clear that the total product of all the labor and capital could be increased, as in the case of the roads, by transferring some of it from the superior to the inferior farm. This application of the reasoning will probably suggest the fallacy to any one familiar with conventional economic theory. The statement does in fact indicate what would happen *if no one owned the superior farm.* But under private appropriation and self-seeking exploitation of the land the course of events is very different. It is in fact the social function of ownership to prevent this excessive investment in superior situations.

Professor Pigou's logic in regard to the roads is, as logic, quite unexceptionable. Its weakness is one frequently met with in economic theorizing, namely that the assumptions diverge in essential respects from the facts of real economic situations.[5] The most essential feature of competitive conditions is reversed, the feature namely, of the private ownership of the factors practically significant for production. If the roads are

5. For the edification of the advocates of "inductive economics" it may be observed that the "facts" are not in dispute; that what is needed in the case is not more refined observation or the gathering of "statistics," but simply correct theorising. There is, of course, also a large field in which the crucial facts are *not* obvious.

assumed to be subject to private appropriation and exploitation, precisely the ideal situation which would be established by the imaginary tax will be brought about through the operation of ordinary economic motives. The owner of the broad road could not under effective competition charge anything for its use. If an agency of production is not subject to diminishing returns, and cannot be monopolized, there is, in fact, no incentive to its appropriation, and it will remain a free good. But the owner of the narrow road can charge for its use a toll representing its "superiority" over the free road, in accordance with the theory of rent, which is as old as Ricardian economics. An application of the familiar reasoning to this case will show that the toll will exactly equal the ideal tax above considered, — tho the application may need to be more careful and complete than that made by many of the expositors of the classical theory.

The owner of a superior opportunity for investment can set the charge for its use at any amount not greater than the excess of the product of the first unit of investment above what that unit could produce on the free opportunity. Under this charge investment will flow into the superior road up to the point where congestion and diminishing returns set in. (It is better in such a simple case to use the notion of diminishing returns than to use that of diminishing costs, since in the large the practical objective is to maximize the product of given resources and not to minimize the expenditure of resources in producing a given product.) By reducing the charge, the owner will increase the amount of traffic using his road (or in general the amount of investment of labor and capital in any opportunity). But obviously the owner of the road will not set the charge so low that the last truck which uses the road secures a return in ex-

cess of the amount which it adds to the total product of the road (that is, of all the trucks which use it). This is clearer if we think of the owner of the road hiring the trucks instead of their hiring the use of the road. The effect is the same either way; it is still the same if some third party hires the use of both. The toll or rent will be so adjusted that *added* product of the last truck which uses the narrow road is just equal to what it could produce on the broad road. No truck will pay a higher charge, and it is not to the interest of the owner of the road to accept a lower fee. And this adjustment is exactly that which maximizes the total product of both roads.

The argument may be made clearer by the use of simple diagrams.[6]

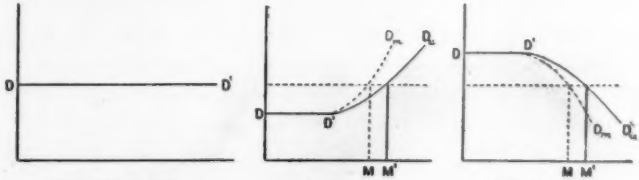

CHART A and B CHART C CHART D

Chart A and B represents the case of constant cost or constant returns, the cost of successive units of output or the return from successive units of investment on the broad road. In Chart C, the curve $DD'D_n$ is a *cost* curve for the narrow road, showing the cost of successive units of output. It starts at a lower level than the cost on the broad road, but at a certain point D', congestion sets in and increasing cost appears. Curve $DD'D_m$ is a curve of *marginal* costs on the narrow road, as Professor Pigou uses the term marginal cost; the marginal cost of the nth unit of product is the difference

6. Cf. Pigou, op. cit., Appendix iii, pp. 931–938.

between the total cost of producing n units and the total cost of producing $n + 1$ units. When costs begin to increase, the marginal cost will increase more rapidly than the cost of the added unit, since the production of each additional unit raises the cost of the earlier units to a level with that of the new unit. It must be observed that the cost of the additional unit is always the same as the cost per unit of the whole supply produced; much economic analysis is vitiated by a spurious separation of these two conceptions of cost.

Chart D represents the same facts as Chart C, but in terms of the product of successive units of investment instead of the cost of successive units of output, that is, as curves of "diminishing returns" instead of "increasing costs." The output begins at a higher level than on the broad road, but at the point D′, which corresponds to the point of the same designation on Chart C, the return from investment begins to fall off. The curve $D'D_u$ shows the actual product of the added unit of investment, and the curve $D'D_m$ its marginal product, its addition to the total. The latter decreases more rapidly, because the application of the additional unit reduces the yield of the earlier ones to equality with its own. The argument is the same, but stated in inverse or reciprocal form. As indicated, the viewpoint of Chart D is to be preferred, and it may be surmised that, if Professor Pigou had put his argument in this form, he would probably have avoided the error into which he was very likely misled by measuring efficiency in terms of cost of output instead of output of resources.[7]

The owner of the road will adjust his toll so that the

7. It may be noted that Robertson makes the opposite contention, that the concepts of increasing and decreasing costs are to be preferred to those of decreasing and increasing returns. Loc. cit., p. 17. He gives no argument for this position. It seems to me that this is the entrepreneur's point of view, while that of either the investor or society is the inverse one advocated in the text above, and is distinctly to be preferred for general analysis.

traffic will take his road out to the point M in Chart C or D. It will *not*, under conditions of profit-seeking exploitation, be continued to M′, as argued by Professor Pigou. The actual output is the same as the "ideal" output, but it is the "ideal" output which is wrongly defined in Pigou's treatment (p. 937). Evidently, the adjustment is correct when the *marginal* product of the last unit of investment on the superior road is equal to the product of a similar unit on the free road. Confusion arises in translating this condition into terms of cost and selling price of product. Selling price will be determined by cost on the free road, or at least these two will be equal, however the causal relation is conceived. That is, the *money* cost of any unit of product is the value of the investment which is necessary to produce it on the free opportunity, where cost is constant, or, in general, at an opportunity margin where rent does not enter. Comparison of the two viewpoints shown by our Charts C and D above shows that under competitive conditions the application of investment to the superior opportunity will be stopped at the point where *marginal real cost* (cost in terms of the transferable investment) is equal to real cost on the free opportunity. When equal additions to investment make equal additions to output, equal units of output have the same cost. But the condition of equilibrium cannot be stated in terms of money cost and money selling price of product on the superior opportunity, *because these would be equal however the investment might be distributed*, whatever rent were charged, or whether the opportunity were appropriated and exploited at all. The condition of equilibrium is that the rent on the superior opportunity is maximized as an aggregate. The rent per unit of output is a variable portion of a total unit cost which is fixed.

Extension of the foregoing argument to the general case of land rent involves no difficulties and will not be carried out in detail. The point is that any opportunity, whether or not it represents a previous investment of any sort, is a productive factor if there is sufficient demand for its use to carry into the stage of diminishing returns the application to it of transferable investment. The charge made by a private owner for the use of such an opportunity serves the socially useful purpose of limiting the application of investment to the point where *marginal* product instead of product per unit is equal to the product of investment in free (rentless) opportunities; and under competitive conditions this charge will be fixed at the level which does make marginal products equal, and thus maximizes productivity on the whole. [8]

It is pertinent to add that in real life, the original "appropriation" of such opportunities by private owners involves investment in exploration, in detailed investigation and appraisal by trial and error of the findings, in development work of many kinds necessary to secure and market a product — besides the cost of buying off or killing or driving off previous claimants.

8. It is a theoretically interesting fact that the rent on an opportunity which maximizes the return to its owner and brings about the socially correct investment in it is its "marginal product," in the same sense as used to describe the competitive remuneration of other productive factors transferable from one use to another or ultimately derived from labor and waiting. It is exactly the amount by which the product of the whole competitive system would be reduced if the opportunity were held out of use or destroyed, and the investment which would be combined with it were put to the next best possible use. This point is brought out in Professor Young's chapter on Rent in Ely's Outlines of Economics (pp. 409, 410 in the fourth edition). Professor Young also pointed out the essential fallacy in Professor Pigou's argument, in a review of the latter's earlier work on Wealth and Welfare (Quarterly Journal of Economics, August 1913).

The relation between "investment" and "opportunity" is an interesting question, by no means so simple as it is commonly assumed to be. In the writer's view there is little basis for the common distinction in this regard between "natural resources" and labor or capital. The qualities of real significance for economic theory are the conditions of supply and the degree of fluidity or its opposite, specialization to a particular use. In a critical examination neither attribute forms a basis for erecting natural agents into a separate class.

Under competitive conditions, again, investment in such activities of "appropriation" would not yield a greater return than investment in any other field. These activities are indeed subject to a large "aleatory element"; they are much affected by luck. But there is no evidence proving either that the luck element is greater than in other activities relating to economic progress, or that in fact the average reward has been greater than that which might have been had from conservative investments.

II

While Professor Pigou constantly refers to industries of decreasing cost, or increasing returns, the principles at issue do not necessarily imply more than a *difference* in the way in which efficiency varies with size from one industry to another. Some of Professor Graham's reasoning in regard to international trade and international value depends upon decreasing cost as such. It seems advisable, before taking up his argument concretely, to devote a few paragraphs to this conception, which the writer believes to involve serious fallacies, and to the meaning of cost and its variation.

Valuation is an aspect of conscious choice. Apart from a necessity of choosing, values have no meaning or existence. Valuation *is* a comparison of values. A single value, existing in isolation, can no more be imagined than can a single force without some other force opposed to it as a "reaction" to its "action." Value is in fact the complete analogue of force in the interpretation of human activity, and in a behavioristic formulation is identical with force—which is to say, it is an instrumental idea, metaphysically non-existent. Fundamentally, then, the cost of any value is simply the value that is given up when it is chosen; it is

just the reaction or resistance to choice which makes it choice. Ordinarily we speak of cost as a consumption of "resources" of some kind, but everyone recognizes that resources have no value in themselves; that they simply represent the products which could have been had by their use in some other direction than the one chosen.

The notion of cost suffers greatly in logical clearness from confusion with the vague and ambiguous term "pain." In the broad true sense every cost is a pain, and the two are identical. Little or nothing can be made of the distinction between pain and the sacrifice of pleasure, or between pleasure and escape from pain. The subject cannot be gone into here from the point of view of psychology; it is enough to point out that the way in which a particular person regards a particular sacrifice depends mainly upon the direction of *change* in the affective tone of his consciousness or upon the established level of expectations. The essential thing is that the pleasure-pain character of a value is irrelevant, that the universal meaning of cost is the sacrifice of a value-alternative. This is just as true of the "irksomeness" of labor, as of a payment of money. The irksomeness of digging a ditch reflects the value of the loafing or playing which might be done instead. And there is no significant difference between this irksomeness or pain and that of using the proceeds of the sale of a liberty bond to pay a doctor's bill when it might have been used to procure a fortnight's vacation.[9]

9. Besides confusion with the notion of pain, which has at last obtained in psychology a definite meaning independent of unpleasantness, the notion of cost encounters in economics another source of obscurity. This is in the relation between those values which do not pass through the market and receive prices and those which do. The "loafing" which underlies the irksomeness of labor is such a value, and there is a tendency to associate the notion of cost with these non-pecuniary values. In this connection it should be noted that not merely labor but all types of productive service are subject to the competition of uses which yield their satisfactions directly and not through the channel of a marketable product. Thus land is used for lawns as well as for fields, and examples could be multiplied at will.

The natural and common rule in choice is necessarily that of increasing cost. In the exchange of one good for another at a fixed ratio, the further the exchange is carried, the more "utility" is given up and the less is secured. This is merely the law of diminishing utility. It is only when one commodity is given up in order that another may be produced by the use of the common and divertible productive energy that we ordinarily think of the variation of cost. If two commodities are produced by a single homogeneous productive factor, there is no variation of cost as successive portions of one are given up to procure more of the other by shifting that factor—except in the sense of increasing utility cost as met with in the case of exchange. Ordinarily, however, new considerations enter, as a matter of fact. If we wish to produce more wheat by producing less corn, we find that the further the shift of production is carried, the more *bushels* of corn (as well as corn value) have to be given up to produce a *bushel* of wheat (and still more for a given amount of wheat value). This is the economic principle of increasing cost (decreasing returns) as generally understood, reduced to its lowest terms and freed from ambiguity.

When costs are measured in value terms and product in physical units there are two sorts of reasons for increasing cost, one reflecting value changes and the other technological changes. The first would be operative if all productive resources were perfectly homogeneous and perfectly fluid. But this is not, in general, the case, and technological changes supervene which work in the same direction and add to the increase which would otherwise take place in the cost of a unit of the product which is being produced in larger volume. Principal among these technological changes is the fact that some of the resources used to produce the commodity

being sacrificed are not useful in the production of that whose output is being increased, and in consequence the resources which are transferred are used in progressively larger proportions in the second industry and in smaller proportions in the first, in combination with certain other resources which are specialized to the two industries respectively. The consequent reduction in the physical productive effect of the transferred factors is what is meant by diminishing returns in one of the many narrower uses of that highly ambiguous expression. Another technological cause still further aggravating the tendency to increasing costs arises from the fact that productive factors are not really homogeneous or uniform in quality. As productive power is transferred from corn to wheat, it will be found that the concrete men, acres, and implements transferred are those progressively more suitable for corn-growing and less suitable for wheat. Thus each unit suffers a progressively greater reduction in its value in terms of units of either commodity, or it takes more units to represent in the wheat industry the value of a single unit in the corn industry, and value costs of wheat mount still higher for this third reason.

All three changes so far noted clearly involve increasing cost in the real sense, the amount of value[1] outlay or sacrifice necessary to produce an additional physical unit of the commodity whose production is increased. In addition to these we have to consider two further possible sources of increased cost. The first is that, when an additional unit of, say, wheat is produced, and the factors transferable from other industries to wheat are raised in price, the quantities of these factors already used to produce wheat will rise in price along with those

1. Value as used in this discussion means "real" value, relative significance or utility. No assertion as to exchange value or price is implied.

added to the industry. Should all this increase in cost be charged up to the production of the last unit of wheat produced, which causes it to appear? In a sense, this is in truth a social cost of this last unit. Yet the transfer of productive energy will not take place unless there has been a shift in the market estimate of wheat in comparison with competing commodities such as to justify it. That is, as the exchange system measures values, making all units of the same good equal in value, the increase in the total value of the wheat must be greater than the decrease in the value of the output of competing commodities. (A discrepancy — *in either direction* — may result from considering the potential significances of infra-marginal units commonly designated as consumers' surplus.) The second additional possible source of increased cost is the increased payments which will be made for the specialized factors used in producing wheat,[2] the cost elements which are of the nature of rent or surplus. These payments evidently do not represent social costs at all, but redistributions of product merely. Such redistributions may be "good," or "bad," depending on the moral position, according to some standard, of the owners of the two classes of factors respectively.

Decreasing cost (or increasing returns) is alleged to result in several ways, which can be dealt with but briefly. The most important is the technological economy of large-scale production. When the output of a commodity is increased, the cost of the productive services used to produce it will be higher; but this increase in their cost per unit may, it is held, be more than offset by economies in utilization, made possible by larger-scale operations, which increase the amount of product

2. The fallacy of identifying specialised factors with natural agents and transferable factors with labor and capital has been referred to above. It will not be elaborated in this paper.

obtained from given quantities of materials and resources consumed.[3] But technological economies arise from increasing the size of the productive unit, not from increasing the total output of the industry as a whole. The possibility of realizing such economies — by the distribution of "overhead," or more elaborate division of labor, or use of machinery — tends to bring about an increase in the *scale* of production, but this may happen independently of any change in the output of the industry. If competition is effective, the size of the productive unit will tend to grow until *either* no further economies are obtainable, *or* there is only one establishment left and the industry is a monopoly. When all establishments have been brought to the most efficient size, variation in total output is a matter of changing their *number*, in which no technical economies are involved.

The rejoinder to the above argument is the doctrine of "external economies," which surely rests upon a misconception. Economies may be "external" to a particular establishment or technical production unit, but they are not external to the industry if they affect its efficiency. The portion of the productive process carried on in a particular unit is an accidental consideration. External economies in one business unit are internal economies in some other, within the industry. Any branch or stage in the creation of a product which offers continuously a chance for technical economies with increase in the scale of operations must eventuate either in monopoly or in leaving the tendency behind and establishing the normal relation of increasing cost with increasing size. If the organization unit is not small

3. Professor Graham says (p. 203, note) that decreasing cost is an "aspect of the law of proportionality." This is a form of statement frequently met with, but rests on a misconception sufficiently refuted in the text. It is true only accidentally, if it is true in any general sense at all, that a more elaborate technology is associated with a change in the proportions of the factors.

in comparison with the industry as a whole, a totally different law must be applied to the relation between output, cost, and price.

Two other alleged sources of decreasing cost are the stimulation of demand and the stimulation of invention. Neither can properly be regarded as an effect of increasing output, other things being equal. Producing a commodity and distributing it at a loss might result in developing a taste for it, but would be no different in principle from any other method of spending money to produce this result. Inventions tend to enlarge the scale of production rather than large-scale production to cause inventions. It is true that an increase in demand from some outside cause may stimulate invention, but the action takes place through first making the industry highly profitable. The result is not uniform or dependable, nor is it due to increased production as such.

These brief statements form a mere summary of the argument that, with reference to long-run tendencies under given general conditions, increasing the output of a commodity must increase its cost of production unless the industry is, or becomes, a monopoly. They also indicate the nature of the relation between social cost and entrepreneur's money cost. Under competition, transferable resources are distributed among alternative uses in such a way as to yield equal marginal[4] value product everywhere, which is the arrangement that maximizes production, as measured by value, on the whole. Non-transferable resources secure "rents" which equalize money costs to all producers and for all units of product under the foregoing condition; or, better, the rents bring about that allocation of resources which maximizes production, under the condition that money costs are equalized.

4. "Differential" is the term in use in other sciences for the idea commonly referred to as a marginal unit in economics.

A further major fallacy in value theory which suffuses Professor Graham's argument will be pointed out in general terms before proceeding with detailed criticism. The reference is to the notorious "law of reciprocal demand." This so-called law, that the prices of commodities exchanged internationally are so adjusted that a country's exports pay for its imports, is at best a truism. To say that what one gives in exchange pays for what one gets is merely a statement of the fact that one is exchanged for the other. What calls for explanation in the case is the process which fixes *how much* of one thing will be parted with, and *how much* of the other received in return.

III

We are now ready to take up concretely the proposed refutation of the law of comparative advantage. Professor Graham begins by assuming two countries, which he calls A and B, but which it appears simpler to designate as England and America respectively. Suppose then that in England

10 days' labor produces 40 units of wheat
10 days' labor produces 40 watches;

in America

10 days' labor produces 40 units of wheat
10 days' labor produces 30 watches.

America has a comparative advantage in wheat, England in watches.[5] According to the accepted theory, trade at any ratio intermediate between the two cost

5. The use of labor as equivalent to productive power, or the treatment of labor as the only factor which may be transferred from one industry to the other, is a simplification likely to mislead the unwary, but it will not be criticised here. It is of interest to note, however, that historically the whole doctrine of comparative cost was a prop for a labor cost theory of value.

ratios will be of advantage to both countries. Our author assumes it to begin at the ration of 35 watches for 40 units of wheat. Then, for each ten days' labor devoted to producing wheat and exchanging for watches, America can get 35 watches instead of the 30 which could be produced by using the same labor in producing the watches. England, for each ten days' labor devoted to producing watches and exchanging for wheat can secure $\frac{40}{35} \times 40$ $(= 45\frac{5}{7})$ units of wheat, instead of the 40 units which could be directly produced with the same labor.

So far, well and good for the theory. But at this point Professor Graham's blows begin to fall. Assuming that wheat-growing is an industry of increasing, and watch-making one of decreasing costs, it will come to pass, as the two countries progressively specialize, that the cost of both commodities is decreased for England and increased for America. It clearly follows, first, that if the process goes on long enough, America will begin to lose, and just as clearly, from the assumptions of the article, that the process will go on forever! For the further it is carried, the greater becomes England's comparative advantage in the production of watches and the greater becomes America's comparative advantage in the production of wheat. Yet this conclusion must arouse a suspicion that there is something wrong in Denmark.

First, in accordance with the argument above, drop the assumption of decreasing cost as a permanent condition in the watch-making industry; then the two cost ratios in the two countries must come together instead of separating as the specialization of productive efforts progresses. Under any assumption whatever, *either* this must happen, *or else* one country must entirely cease to produce one of the commodities. In the first event, the exchange ratio will be the common cost ratio

of the two countries (transportation costs being neglected, as usual in these discussions). If the second result ensues, — that one country abandons one of the industries, — *the exchange ratio will be the cost ratio in the country which still produces both commodities* (assuming, always, that monopoly is absent). Professor Graham "assumes" that the comparative advantage has become progressively greater as the result of specialization and then "assumes" (page 210) that, with the cost ratio in one country half what it is in the other, the market price may be established at any ratio between the two. In reality the only possible result under the cost conditions he states would be that America would stop producing watches at once and would exchange wheat for watches at the ratio of 40 for 40 (the cost ratio in England), thus making a *gain* of 20 watches on each ten days' labor so employed as compared with using it to produce the watches in America.

Next, the author proposes to consider the effect of interpreting his cost figures as representing marginal cost instead of cost per unit. He gets no further, however, than to average up the marginal with assumed inframarginal costs, which amounts merely to a slight change in the numbers assumed for cost per unit. He nowhere gives an explicit statement of what he means by cost, and must be suspected of not having clearly faced the difficulties and ambiguities in the notion, as brought out in the argument of the first and second parts of this paper. Certainly it will not do to recognize a possible permanent difference under competition in the money cost of different units of a supply, or in their marginal real cost. The money costs which represent real costs differ in different situations, but the rent element always equalizes them, or produces *coincidence* between equality of money cost, which would result in any case, and equal-

ity of marginal real cost, which is the social desideratum. Value and cost are like action and reaction, axiomatically equal, and as in an exchange system the value of all similar units must be equal, so must their costs.

In the writer's opinion this also is socially and morally correct. We do not, and should not, value the first slice of bread more highly than the last, nor systematically value anything at more or less than its necessary cost. As between units of supply consumed by different persons, the case is different, because different persons do not come into the market with equal exchange power in the form of productive capacity. But the question is one of ethics, entirely outside the field of exchange as a mechanical problem. The famous surpluses have the same kind of significance as potential energy in physics. They relate to possible changes in fundamental conditions, but have nothing to do with the conditions of equilibrium in any particular situation. With reference to relations among actual magnitudes, cost curves and utility curves should always be interpreted to mean that, as supply varies, the cost, or utility, of every unit changes in the manner shown by the curve.

Marginal money cost, in the sense in which it is used by Professor Pigou, is meaningless with relation to competitive conditions. It is true that under monopoly the supply is so adjusted that the contribution of the last unit to total selling price (marginal demand price) is equal to the addition to total cost incurred in consequence of producing it (marginal supply price); but this is a mere equivalent of the statement that the difference between total cost and total selling price is made a maximum. Professor Graham seems to use the expression marginal cost to mean the particular money expense of producing the last unit of supply; but, as already stated, there cannot in the long run under competitive

conditions be a difference between the cost of this unit and that of any other, or the cost per unit of producing the whole supply.

Professor Graham's article makes use at several points of the effects of different elasticities of demand for different goods, especially as between agricultural products and manufactures. He fails to recognize that, with reference to large and inclusive groups of commodities, demand, which is an exchange *ratio*, is merely a different view of a production ratio, and hence of a cost ratio. In discussing the sale of a single commodity in a complicated economic society and with reference to small changes, it is permissible to treat money as an absolute; but in reducing all exchange to barter between two classes of goods, this procedure is quite inadmissible.

Moreover, consideration of the actual course of events when trade is opened up will show that elasticity of demand has little to do with the special theory of international trade or international value. Each country continues to specialize in the commodities in which it has a comparative advantage, until there is no gain to be secured from further specialization; that is, until it will cost as much to secure the next unit of the imported good by exchange as it will to produce it within the country. Now at a certain point, a country will obtain as much of the imported good as it would have produced for itself under an equilibrium adjustment within itself if foreign trade had been prohibited; and in consequence of the saving of productive power effected by the trade, a part of the resources which in its absence would be used to produce that commodity will be left to be disposed of. *Beyond this point*, that is, in the disposition of the saved productive power, elasticities of demand come into operation. This fund of saved productive power will not all be used to produce either of the com-

modities concerned in the exchange with the foreign nation, but will be distributed over the whole field of production in accordance with the ordinary laws of supply and demand.

The foregoing paragraphs are believed to cover the main points in the writings criticized which involve fallacies in the interpretation of cost and so come under the title of this paper. The entire argument of Professor Graham's second article falls to the ground, as he has stated it, as soon as the principles of cost are applied to the determination of international values instead of "assuming" the latter. Many further points in his first article are especially inviting to criticism, but fall outside the scope of the present paper. It suffices for the solution of the essential problem of international trade to recognize that the production of one good to exchange for another is an *alternative method of producing* the second commodity. Under competitive conditions, productive resources will not be used in this indirect process of production unless the yield is greater than that obtained by the use of the direct method. The task of economic analysis is to show why the profit-seeking motive impels the private producer to put resources to the use which brings the largest yield. Now to the entrepreneur producers of wheat and watches, in a case like that used in the illustration, the choice is not a question of comparative advantage, but of absolute profit or loss. If ten days' labor will produce a quantity of wheat which can be exchanged for more than 40 watches, then that amount of labor will be *worth more* than 40 watches, and the business enterprise which uses it to produce the watches will simply lose money. It is an example of the common fallacy of thinking in terms of physical efficiency, whereas efficiency is in the nature of the case a relation between value magnitudes.

That free enterprise is not a perfectly ideal system of social organization is a proposition not to be gainsaid, and nothing is further from the aims of the present writer than to set up the contention that it is. But in his opinion the weaknesses and failures of the system lie outside the field of the mechanics of exchange under the theoretical conditions of perfect competition. It is probable that *all* efforts to prove a continued bias in the workings of competition as such, along the lines followed by Professors Pigou and Graham, are doomed to failure. Under certain theoretical conditions, more or less consciously and definitely assumed in general by economic theorists, the system would be ideal. The correct form of the problem of general criticism referred to at the outset of this paper is, therefore, that of bringing these lurking assumptions above the threshold into the realm of the explicit and of contrasting them with the facts of life — the conditions under which competitive dealings are actually carried on.[6]

When the problem is attacked from this point of view, the critic finds himself moving among considerations very different from the logical quantitative relations of such discussions as the foregoing. Human beings are not "individuals," to begin with; a large majority of them are not even legally competent to contract. The values of life are not, in the main, reducible to satisfactions obtained from the consumption of exchangeable goods and services. Such desires as people have for goods and services are not their own in any original sense, but are the product of social influence of innumerable kinds and of every moral grade, largely manufactured by the competitive system itself. The productive capacities in their own persons and in

6. The great bulk of the critical material in Professor Pigou's Wealth and Welfare is of this character.

owned external things which form the ultimate stock in trade of the human being are derived from an uncertain mixture of conscientious effort, inheritance, pure luck, and outright force and fraud. He cannot be well or truly informed regarding the markets for the productive power he possesses, and the information which he gets has a way of coming to him after the time when it would be of use. The business organizations which are the directing divinities of the system are but groups of ignorant and frail beings like the individuals with whom they deal. (In the perfectly ideal order of theory the problem of management would be non-existent!) The system as a whole is dependent upon an outside organization, an authoritarian state, made up also of ignorant and frail human beings, to provide a setting in which it can operate at all. Besides watching over the dependent and non-contracting, the state must define and protect property rights, enforce contract and prevent non-contractual (compulsory) transactions, maintain a circulating medium, and most especially prevent that collusion and monopoly, the antithesis of competition, into which competitive relations constantly tend to gravitate. It is in the field indicated by this summary list of postulates, rather than in that of the mechanics of exchange relations, that we must work out the ultimate critique of free enterprise.

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THE UNITED STATES STEEL CORPORATION AND INDUSTRIAL STABILIZATION

SUMMARY

The study of the influence of combinations upon industrial stabilization is socially significant, 608. — Growth and general character of the products of the iron and steel industry, 609. — The five-year moving average used as a basis for measuring fluctuations in production, 610. — Comparison of average deviations from our moving average in the cases of pig iron, crude steel, and rolled iron and steel show greater fluctuation in output since the establishment of the Steel Corporation than before it, 612. — Annual fluctuations since 1901 are more abrupt and pronounced in years of depression than in years of expansion, 616. — They average less in the war and post-war years than in the period immediately preceding the war, 616. — Output of rails for the years 1880–1901 and 1902–22 shows less difference in average deviation than steel products generally; but during the period 1902–15, when prices were rigidly fixed, fluctuations were very great, 618. — Average numbers of workers employed each year by the Steel Corporation show less deviation from our moving average than do figures for output, 622. — The larger percentages for variation in production during the period succeeding the establishment of the Steel Corporation are due to large and drastic curtailments in years of depression, 626. — The promptness with which recovery takes place may furnish some support for the contention that in the long run price stabilization makes for industrial stabilization, 630.

THE study of the influence of large combinations upon prices is incomplete without an examination of their effects upon industrial stability. In those industries where evidence points to price stabilization [1] being a result of such combinations, the question arises, has such price uniformity been secured at the expense of a corresponding industrial stabilization, or does this price uniformity show a tendency to reduce trade fluctuations? In other words, does a price policy shaped in

1. This subject is discussed by the present writer with reference to the iron and steel industry in the Quarterly Journal of Economics, November 1923.

the interest of stabilization necessitate on the average greater variation in output, with consequent increase of fluctuations in employment, than under ordinary conditions of competition, or does it so react on business conditions as to render production more steady and employment more permanent?

The social significance of these questions is obvious. With the growth of large-scale production over an increasing area of the modern industrial field, an examination of the influences of this growth on the general stability of trade conditions is urgently needed. What study has been made of the social effects of the development of trusts and combinations in recent times has been largely confined to prices and wages. With respect to the former, investigations have been concerned mainly with the question whether or not production is so regulated as to illustrate the operation of "the law of monopoly price," and with reference to the latter, whether or not wage rates show any tendency toward augmentation or reduction as compared with corresponding rates not similarly influenced. The question whether or not the present-day movement toward large consolidations is likely to have any pronounced effect, beneficial or otherwise, upon trade oscillations has received less attention than its importance demands. Involved in this question is not only the business man's interest that normal tendencies and growth be strengthened, but also the laborer's concern in the security of his job.

The iron and steel industry, which has been influenced by the consolidation movement in this country for over two decades and whose fortunes are so bound up with business conditions in general that it has received the designation of "barometer of trade," is especially worthy of study in this connection. An examination of

this industry with a view of determining the effects of large combinations upon stabilization, particularly the influence of the United States Steel Corporation, necessitates some preliminary observations upon the general character and growth of the industry itself. In order to determine with some degree of precision the fluctuations of output it is essential to have a tolerably clear conception of the industry we are studying, especially the nature of the products whose fluctuations are being measured. This is particularly true where the industry has for several decades exhibited a remarkable growth, and where the proportionate increases in output among the several classes of products have varied greatly.

At the present time the manufacture of steel is of overshadowing importance in the iron industry. Something like 75 to 80 per cent of the pig-iron output of the United States is manufactured into steel. With the use of iron and steel scrap, the country's output of steel in terms of ingots and castings has for the past decade actually exceeded that of pig iron.[2] Of the steel produced in the United States about 75 or 80 per cent assumes various rolled forms, like rails, plates and sheets, structural shapes and wire. Of the rolled forms the group consisting of plates and sheets is the largest, constituting between 25 and 30 per cent of the total. The output of standard-section steel rails amounts to less than 10 per cent of this amount.

This proportionate output of iron and steel products is materially different from what it was three or four decades ago. It was not until the year 1887 that the steel production of the United States amounted to as much as 50 per cent of pig-iron output, and not until 1892

2. This use of scrap has become very characteristic of the industry with the introduction of the open-hearth process, which in recent years has largely supplanted the Bessemer process. In open-hearth furnaces in the eastern part of the country about one half of the material used in the manufacture of steel consists of scrap.

that the proportionate output of steel to pig iron remained permanently above the 50 per cent level. Rolling-mill products in the late eighties and early nineties constituted then as now a large proportion of the iron and steel output of the country, but much of the rolled material was made of iron rather than steel. Of rolled steel over half consisted of standard-section rails, and this rail production constituted from 25 to 40 per cent of the total of all rolled iron and steel. Even as late as the opening years of the present century the manufacture of rails was characterized as the backbone of the steel industry.[3]

The general progress of the steel industry of the United States, and the changes in the proportionate output of the several groups of the material mentioned, may be indicated for each fifth year during the period beginning with 1887,[4] as follows:

GROWTH OF IRON AND STEEL PRODUCTION IN THE UNITED STATES FROM 1887 TO 1922 [5]

Year	Pig iron (thousands of gross tons)	Steel ingots and castings (thousands of gross tons)	Rolled iron and steel (thousands of gross tons)	Iron and steel rails (thousands of gross tons)	Plates and sheets (thousands of gross tons)
1887	6,417	3,339	5,236	2,140	603
1892	9,157	4,928	6,166	1,552	751
1897	9,653	7,157	7,002	1,648	1,207
1902	17,821	14,947	13,944	2,948	2,665
1907	25,781	23,363	19,865	3,634	4,249
1912	29,727	31,251	24,657	3,328	5,875
1917	38,621	45,061	33,068	2,944	8,268
1922	27,220	35,603	26,452	2,172	7,968

3. Rails were the first important rolling-mill product to be made in large quantities from steel. After 1876 over half the annual rail output of the United States was steel. Since 1887 less than 1 per cent of this annual production was made of iron. See tabulation in Annual Statistical Report of the American Iron and Steel Institute for 1922, p. 41.

4. Prior to 1887 the figures for rolled iron and steel, with the exception of rails, are very uncertain and rather fragmentary.

5. Annual Statistical Report of the American Iron and Steel Institute for 1922, pp. 9, 10, and 34.

The tabulation shows that in the period covered the greater part of the pig iron produced in the United States was transformed into rolled material, much of which in the earlier years was iron. It may be further noted that in the year 1887 nearly two thirds of the steel output of the country went into the manufacture of rails,[6] and this product constituted approximately two fifths of the entire rolled iron and steel production.

A study of comparative fluctuations in the volume of the steel trade extending as far back as the late eighties should embody an examination of the output both of steel in the form of ingots and castings and of rolled products made of iron and steel. In the case of rolling-mill products, rails constitute the principal article whose output during the entire period has formed a considerable, tho diminishing, proportion of the total. Other forms of tonnage steel,[7] like plates and sheets and structural shapes, were being used in increasing quantities, but their production in the eighties was limited and, to a considerable extent, spasmodic. In fact, before 1892 there were no authentic records of the country's output of structural shapes segregated from other rolled material.

The growth of the steel industry in the United States during the past forty or fifty years has been phenomenal. In a recent address at a stockholders' meeting Judge Gary, commenting upon the producing capacity of the United States Steel Corporation, stated that this capacity had been increased by 112 per cent since the organization of the corporation and that the volume of business is increasing constantly.[8] This statement typi-

6. In 1887 over 99 per cent of the rails manufactured in the United States were steel.

7. The phrase "tonnage steel" is used to designate steel manufactured in large quantities and generally sold by the ton. This tonnage product is made by the Bessemer or open-hearth process. Other steels are made in smaller quantities by the crucible and electric-furnace methods.

8. New York Times, April 22, 1924.

fies what has been taking place in the industry generally, as the growth of the Steel Corporation has not been at the expense of independent concerns, whose share in the country's business has shown a tendency to increase rather than diminish. This development will necessitate the use of a moving average or norm from which annual fluctuations in production may be measured. The establishment of such an average in this industry is not easy, in view of the fact that trade oscillations are by no means regular and the ratio of variation between the country's steel consumption and general price levels is not entirely free from some anomalous relationships. Nevertheless, a mean or norm can be established which will show the approximate annual deviations from what may be regarded the country's normal output for each year.

For purposes of measurement a moving average based upon a five-year period has been selected to show such a norm and indicate the general trend of output free from annual fluctuations. During part of the time covered by our investigation a longer span of years could well be employed in the determination of this average, but not throughout the entire period. During the World War, for example, a span of years covering a much greater length of time than the duration of that struggle would tend to distort the average production as affected by the war. A more limited number of years would allow too great an influence for individual years, particularly where the deviations from the norm or average are very great. The resort to a varying span of years is at best hazardous and for most purposes unscientific.

In discussing, then, the influence of combinations, particularly that of the Steel Corporation, upon regularity of production, comparison will be made between the deviations from the normal output of iron and steel in

the years antedating the formation of that combination (including the year 1901, when it was in process of organization) and the deviations in the years succeeding its definite establishment.

It may be said in this connection that the years 1898 to 1900, inclusive, were characterized by the formation of large steel consolidations in the Middle West, and that some of these, like the American Tin Plate Company and the American Steel and Wire Company, had practically a monopoly of the output of certain grades of steel. However, this monopoly control covered only a small part of the steel trade and lasted but a short time. The violent fluctuations in prices during these years show that no definite price policy prevailed in the industry generally. In fact, the fear of increasing competition resulting from the invasion by these several combinations of each other's fields had much to do with the organization of the Steel Corporation itself. Only since the formation of this concern has the steel trade generally felt the effect of a definite price policy.

In studying the effect of this policy upon fluctuations in output, it may be observed that the number of years included in our period antedating and witnessing the formation of the Steel Corporation is fewer than the number in the period succeeding its establishment. This is due to the fact that reliable statistics for the output of some important grades of iron and steel for earlier years do not exist.[9] The earlier period, however, is sufficiently long to measure approximately the average percentages of annual deviations from our five-year moving norm before the organization of the Steel Corporation, and to compare these averages with the corresponding ones for the years succeeding its establishment.

9. The American Iron and Steel Institute publishes figures for rolled iron and steel only as far back as the year 1887. The figures for pig iron and steel ingots and castings go back much further. Tolerably accurate statistics concerning rail production may be had as far back as the middle seventies.

In the following table the country's production of pig iron, steel ingots and castings, and rolled iron and steel, with percentages of deviation from a five-year moving average, are given for the years 1887–1901 and 1902–22, and the average percentage of annual variation from this mean for each of the groups of products mentioned and for each of the two periods designated.

PRODUCTION OF PIG IRON, STEEL INGOTS, AND ROLLED IRON AND STEEL, AND PERCENTAGES OF DEVIATION FROM A FIVE-YEAR MOVING AVERAGE[1]

Years 1887–1901

Year	Pig iron (thousands of gross tons)	Percentage of deviation	Steel ingots and castings (thousands of gross tons)	Percentage of deviation	Rolled iron and steel (thousands of gross tons)	Percentage of deviation
1887	6,417	+ 6.1	3,339	+20.1	5,236	*
1888	6,490	− 8.6	2,899	−11.9	4,617	*
1889	7,604	+ 0.1	3,386	− 4.9	5,237	− 1.2
1890	9,203	+13.0	4,277	+10.3	6,023	+ 9.8
1891	8,280	+ 0.1	3,904	− 4.8	5,391	− 3.0
1892	9,157	+13.3	4,928	+14.4	6,166	+13.4
1893	7,125	−12.4	4,020	−14.2	4,976	− 9.1
1894	6,657	−18.8	4,412	−10.9	4,642	−15.6
1895	9,446	+13.8	6,115	+13.3	6,190	+ 9.3
1896	8,623	− 6.6	5,282	−17.2	5,516	−13.4
1897	9,653	− 9.1	7,157	− 6.1	7,002	− 6.7
1898	11,774	+ 2.5	8,933	+ 5.8	8,513	+ 4.3
1899	13,621	+ 5.2	10,640	+ 5.6	10,294	+ 8.0
1900	13,789	− 5.4	10,188	−12.4	9,487	−13.1
1901	15,878	+ 0.3	13,474	+ 5.6	12,349	+ 4.2
Percentage of average deviation		7.7		10.5		8.5

* As no figures are reported by the American Iron and Steel Institute for any year prior to 1887 in the case of rolled iron and steel, the earliest year for which a five-year moving average can be computed is 1889; unless we should weight the year 1887, or 1887 and 1888, as is sometimes done in the case of "terminal years."

1. Figures for output are taken from the Annual Statistical Reports of the American Iron and Steel Institute. The plus and minus signs indicate that the percentages are respectively above or below the mean for the year as computed on the basis of a five-year moving average.

Years 1902–1922

Years	Pig iron (thousands of gross tons)	Percentage of deviation	Steel ingots and castings (thousands of gross tons)	Percentage of deviation	Rolled iron and steel (thousands of gross tons)	Percentage of deviation
1902	17,821	+ 8.7	14,947	+11.5	13,944	+14.3
1903	18,009	− 1.3	14,535	− 5.4	13,208	− 3.4
1904	16,497	−18.0	13,860	−20.1	12,013	−20.5
1905	22,992	+ 5.8	20,024	+ 5.2	16,840	+ 3.3
1906	25,307	+18.8	23,398	+22.3	19,588	+22.2
1907	25,781	+11.3	23,363	+11.5	19,865	+13.2
1908	15,936	−33.7	14,023	−36.7	11,828	−36.1
1909	25,795	+ 8.9	23,955	+ 7.8	19,645	+ 6.8
1910	27,304	+11.5	26,095	+ 9.6	21,621	+11.7
1911	23,650	−14.0	23,676	−13.1	19,039	−13.3
1912	29,727	+10.1	31,251	+15.0	24,657	+13.6
1913	30,966	+12.5	31,301	+10.3	24,791	+11.4
1914	23,332	−23.9	23,513	−27.0	18,370	−25.9
1915	29,916	− 7.8	32,151	− 8.0	24,393	− 8.6
1916	39,435	+15.7	42,774	+13.8	32,380	+16.2
1917	38,621	+ 8.5	45,061	+13.2	33,068	+13.2
1918	39,055	+ 5.5	44,462	+ 6.3	31,156	+ 1.1
1919	31,015	− 4.5	34,671	− 6.9	25,102	− 8.0
1920	36,926	+22.3	42,133	+19.3	32,348	+24.6
1921*	16,688	−40.0	19,784	−41.0	14,774	−41.0
1922*	27,220	+ 0.6	35,603	+ 5.5	26,452	+ 4.6
Percentage of average deviation		13.5		14.7		14.9

* The percentages of deviation for the years 1921 and 1922 are based upon departures from a five-year moving average found by counting the output for 1922 twice and three times respectively for each of these years. This was necessary in order to include these years, as the final figures for output for 1923 have not yet been published. As the figures for 1922 are probably below normal for present-day production, this tends to reduce slightly the percentages of average deviation.

It appears that the percentages of average deviation for the years succeeding the organization of the United States Steel Corporation are materially greater than the corresponding percentages for the period from 1887 to 1901, inclusive. The extreme variations are even more pronounced. With the exception of the output of steel ingots and castings for 1887, no figure for any year in the earlier of our two periods shows a variation as great as

20 per cent from our five-year average, and this exception was only one tenth of 1 per cent in excess of that deviation. On the other hand, during the years from 1902 to 1922, inclusive, pig iron showed annual variations in excess of this percentage in four years, steel ingots and castings in five, and rolled iron and steel in six. Another feature of the extreme variations in this period is that they take place for the most part in years of depression, and are decidedly greater than the corresponding variations in years of prosperity. In other words, curtailment of output in years necessitating contraction of business operations tends to be much greater than increases in output in the years demanding an enlargement of business operations.

These facts are all material to the consideration of industrial stabilization as one effect of the consolidation movement and of the effort to reduce price fluctuations. For reasons which will be given later, however, caution is necessary in drawing conclusions. In this, as in many other social and economic problems, immediate and remote effects may be entirely at variance with each other. The question, for example, whether a very drastic curtailment of output in order to prevent demoralization of prices in a year of industrial depression really makes for general trade instability through long periods can hardly be answered by merely measuring annual departures from an established mean. Several years of industrial depression, which occasionally follow a general and pronounced fall in prices, will often show less deviation from a moving average or norm than will a series of years, a few of which are characterized by an abrupt curtailment of output followed by a prompt recovery of normal production.

The outbreak of the World War did not influence the production of iron and steel in this country to anything

like the extent that it did prices. The production of steel reached its highest point in the year 1917; but this output was only about one third greater than in the year 1913. The average level of steel prices during the same year ranged from 100 to 200 per cent higher than in 1913.[2] This marked advance in price as compared with increases of production was due to the inability of the capacity of the country's steel mills to meet immediately the heavy demands made upon them in the year of our entrance into the war. It is worthy of note in this connection that the percentages of average deviation in output from our five-year moving average are slightly less for the war and post-war years from 1915 to 1922, inclusive, than for the pre-war years from 1902 to 1914. The average deviations for these two periods may be indicated as follows:

PERCENTAGE OF AVERAGE ANNUAL DEVIATION FROM A FIVE-YEAR MOVING AVERAGE

	Pig iron (per cent)	Steel ingots and castings (per cent)	Rolled iron and steel (per cent)
1902–1914	13.7	15.0	15.1
1915–1922	13.1	14.2	14.6

These figures show that the greater deviations from our five-year mean in the period from 1902 to 1922 are not accounted for by trade oscillations incident to the World War and the industrial adjustments in the years immediately following.

The table above for the country's production of pig iron and steel for the years 1887 to 1922 shows an average annual variation from our norm which is materially greater in the period following the establishment of the United States Steel Corporation than in the years preceding its organization. In other words the iron and

2. During June and July 1917 several steel products were from 200 to 400 per cent above their pre-war level. Steel billets were quoted at more than five times their price in 1913.

steel industry, measured in terms of annual output, has on the whole been less stable since the organization of the Steel Corporation than before. The reduced fluctuations in price quotations so noticeable in the years following 1901 until after the outbreak of the World War coincided with marked and increased changes in annual production. Inferentially, price stabilization has required frequent and, in some cases, drastic adjustments with respect to output to meet market conditions.

The production of rails in the United States shows some interesting features in this connection, especially as this commodity since 1901 has been quoted at fixed prices for longer periods than any other important article in the industry. In the table on page 619 is shown the country's output of rails for the years 1880 to 1901, inclusive, compared with the corresponding production during the period from 1902 to 1922.

The difference in the percentages of average deviation for our two periods in this table is much less than in the tables on pages 614 and 615, which include pig iron, steel ingots and castings, and rolled iron and steel. The difference, however, is explained by the large variations from year to year in the demand for rails incident to the building and completion of certain Pacific railroads in the decade from 1880 to 1890. During these ten years the country's railroad mileage increased more than in any other corresponding period of the nation's history.[3] The demand for rails not only was large,[4] but fluctuated

3. The railroad mileage of the United States in 1880 was 93,267, and in 1890, 163,597. In other words, over 70,000 miles were added to the railroad development of the country during this ten-year period — approximately 28 per cent of the entire present mileage of the country.

4. The figures for rail output are stated in tons. It should be remembered in this connection that the rails used at this period weighed much less per linear yard than the rails commonly used at the present time. Heavy standard-section rails now weigh 100 to 135 pounds per yard, but in the eighties 60- and 70- pound rails were commonly employed. If the statistics regarding rail output were given in yards, the figures would equal approximately the production of today.

COMPARISON OF THE ANNUAL PRODUCTION OF RAILS IN THE UNITED STATES FOR THE YEARS 1880 TO 1901 WITH THE YEARS 1902 TO 1922 WITH PERCENTAGES OF DEVIATION FROM A FIVE-YEAR MOVING AVERAGE [5]

Year	Years 1880–1901 Production (thousands of gross tons)	Percentage of deviation	Year	Years 1902–1922 Production (thousands of gross tons)	Percentage of deviation
1880	1,305	+ 4.6	1902	2,948	+ 9.3
1881	1,647	+23.5	1903	2,992	+ 3.4
1882	1,508	+12.6	1904	2,285	−26.7
1883	1,215	− 4.6	1905	3,376	+ 3.8
1884	1,022	−19.2	1906	3,978	+30.9
1885	977	−29.7	1907	3,634	+14.0
1886	1,601	+12.0	1908	1,921	−40.7
1887	2,140	+40.0	1909	3,024	+ 0.5
1888	1,404	−17.9	1910	3,636	+23.4
1889	1,522	− 7.8	1911	2,823	−13.5
1890	1,885	+22.9	1912	3,328	+ 9.2
1891	1,307	−11.7	1913	3,503	+26.9
1892	1,552	+12.4	1914	1,945	−29.7
1893	1,136	−10.1	1915	2,204	−18.1
1894	1,022	−16.8	1916	2,855	+14.3
1895	1,306	+ 4.8	1917	2,944	+15.5
1896	1,122	−20.7	1918	2,541	− 3.4
1897	1,648	− 0.8	1919	2,204	−11.6
1898	1,981	+ 5.2	1920	2,604	+11.3
1899	2,273	+ 1.8	1921	2,179	− 3.8
1900	2,386	− 4.3	1922	2,172	− 3.9
1901	2,875	+ 6.7			
Percentage of average deviation		13.1			14.9

widely throughout the greater part of this decade, as the extensive projects for the various transcontinental railroad lines were being carried out. If we limit our figures for rail production during the first of our periods to the same years as those given above for rolled iron and steel, that is, 1889–1901, the percentage of deviation will be reduced from 13.1 to 9.7, as against 14.9 for our second. If on the other hand the figures for pig iron and for steel

5. Figures are derived from the Annual Statistical Report of the American Iron and Steel Institute for 1922, page 41.

ingots and castings be extended to include the years from 1880 to 1886, which are not covered in our earlier tabulation, the percentages for average deviation in our first period will not be materially changed.[6]

The second period, embracing the years from 1902 to 1922, reveals some features of considerable significance. From April 1901 to May 1916, as is well known, the price of Bessemer steel rails (standard-section) at Pennsylvania mills was quoted as $28 per gross ton. As open-hearth rails began to supplant the Bessemer product, a similarly fixed price of $30 per gross ton was quoted for the newer commodity. These quotations exhibited no change until the World War had begun very materially to alter price levels in this country. The fluctuations in rail production during this period of price stabilization are very pronounced. The percentage of average deviation from our five-year moving average for the entire twenty-one years embraced in our second period is 14.9; but this average is considerably increased if the figures for output are confined to the time when rail prices were rigidly fixed at $28 and $30 per gross ton. This average, if limited to the years 1902 to 1915, inclusive, amounts to 17.9 per cent as against 14.9 per cent for the whole period.

From the late eighties to the year of the organization of the Steel Corporation the variations in the country's rail output, as measured in percentages of deviation from our moving average, are very similar to those of steel ingots and castings and rolled iron and steel. There is, on the whole, greater difference in the variations between rails and pig iron, but the broad oscillations are not at all dissimilar. In the period following

6. The figures for pig iron and steel ingots and castings for the years 1887 to 1901, inclusive, show an average deviation from our five-year moving average of 7.7 per cent and 10.5 per cent, respectively. Including the years 1880–1886, the percentages of deviation for the entire period are 7.8 and 10.2.

the establishment of the Steel Corporation, fluctuations in the output of pig iron and steel in the forms above tabulated average for the first fourteen or fifteen years considerably more than in the corresponding period antedating its organization. The fluctuations of steel rails are appreciably greater than those of pig iron and steel. In the war and post-war years there is very little difference in degrees of fluctuation from the preceding fourteen or fifteen years in the cases of pig iron, steel ingots and castings, and rolled iron and steel, but a very noticeable difference in the case of steel rails. The reduced fluctuations in rail output during the war and post-war period are to be attributed, in part at least, to the policy with respect to maintenance of property pursued under Federal control of railroads, and to the political and financial situation in which the roads found themselves after their return to private ownership and management. The rail demand during the greater part of this time was chiefly upkeep and maintenance and had to be met with regularity. It is mainly for this reason that our figures show no such drastic reduction of output for the year 1921 in the case of rails as in those of pig iron and steel products generally.

While conditions other than price policy influence oscillations in production, the fact that there is a substantial difference in the average degrees of these fluctuations in the years preceding and succeeding the establishment of the Steel Corporation is significant. Both of our time intervals are sufficiently long to embrace the usual periodic changes in trade which account for much of the variation in output from year to year in other industries. The fact, too, that rails during fourteen or fifteen years of rigid price maintenance should show an appreciably greater average variation in output than iron and steel products generally, whose prices

were less permanent,[7] is especially noteworthy. This is particularly so when it is remembered that these years, while subject to considerable fluctuations in trade, were probably less so than the corresponding number of years before the organization of the Steel Corporation, or the war and post-war years which succeeded that period.

The oscillations of trade affect permanence of employment. Annual changes in the output of any industry will be reflected in some degree in the number of men employed or engaged in that trade. For the steel industry of the United States there are no adequate statistics to serve as a basis for comparing the annual or other periodic fluctuations in number of employees in years preceding and succeeding the establishment of the Steel Corporation. Annual figures for the industry as a whole are not published. The United States Census tabulations embrace the number of employees, including officials, for decennial years, and since 1900, for every intermediate fifth year. Even for these years comparison is impossible, because the classification of the men employed in the several branches of iron and steel manufacture varies greatly in the different Census Reports, particularly the earlier ones.

Comparison, however, can be made between fluctuations in the average number of workers employed each year by the Steel Corporation itself and the country's annual output of steel. This comparison, while not an absolute measure of the relative variations between the two for the country as a whole, is sufficient to indicate approximately how far employment in the industry varies with changes in production.

In the following table are shown the average number

7. It was stated above (page 620), that the average deviation from our norm in the case of rails for the years 1902–1915 is 17.9 per cent. The corresponding percentages for pig iron, steel ingots and castings, and rolled iron and steel are 13.6, 14.8, and 15.0, respectively.

of men employed each year by the United States Steel Corporation for the period from 1902 to 1923, inclusive, and the variations indicated by these numbers from a five-year moving average.

EMPLOYEES OF THE UNITED STATES STEEL CORPORATION
1902–1923 [8]

Year	Average number for year	Five-year moving average	Deviation from moving average	Percentage of deviation
1902	168,127	163,887*	+ 4,240	+ 2.6
1903	167,709	166,293*	+ 1,416	+ 0.9
1904	147,343	173,159	−25,816	−14.9
1905	180,158	181,569	− 1,411	− 0.8
1906	202,457	181,070	+21,387	+11.6
1907	210,180	190,701	+19,479	+10.2
1908	165,211	198,357	−33,146	−16.7
1909	195,500	197,243	− 1,743	− 0.9
1910	218,435	199,424	+19,011	+ 9.5
1911	196,888	212,163	−15,275	− 7.2
1912	221,085	208,933	+12,152	+ 5.8
1913	228,906	203,472	+25,434	+12.5
1914	179,353	214,628	−35,275	−16.5
1915	191,126	224,022	−32,896	−14.7
1916	252,668	231,983	+20,685	+ 8.9
1917	268,058	246,534	+21,524	+ 8.7
1918	268,710	261,777	+ 6,933	+ 2.6
1919	252,106	249,584	+ 2,522	+ 1.0
1920	267,345	238,958	+28,387	+11.9
1921	191,700	237,374	−45,674	−19.2
1922	214,931	239,110*	−24,179	−10.1
1923	260,786			
Percentage of average deviation				8.9

* The moving average for the years 1902 and 1903 was secured by increasing the weight given to the figure for the terminal year 1902. In a similar way the corresponding average for 1922 was attained by weighting the figure for 1923. As the figures for output stop with the year 1922, no average was computed here for 1923.

The average deviation in the above table for employees is 8.9 per cent, as against averages for output of pig iron and steel during the same period ranging from

8. Figures derived are from the annual reports of the United States Steel Corporation for the years indicated.

13.5 per cent to 14.9 per cent.[9] It should be observed, however, that the number of employees constitutes an average for each year. During several years the number did not change much within these twelve-month periods, but during other years the variation was marked. Thus in 1921 the average number of employees in the different plants of the Corporation was 191,700, but from January to July of that year the number was reduced from a maximum of 263,308 to a minimum of 157,083.[1] This reduction was about 40 per cent from the January figure; and the July number shows a deviation from our moving average of nearly 34 per cent. Generally speaking, the monthly variation in the number of employees within any given year is much less than was the case in 1921, when a very sharp curtailment in steel production took place as a result of the market conditions then prevailing. For the purpose of comparing fluctuations in number of employees with changes in annual output, the year's average of the former is a better unit than one representing an extreme variation for a shorter interval.

How far the figures tabulated are typical of the steel industry generally can be surmised only by considering the proportionate share of the country's steel business controlled by the Steel Corporation itself. As was shown in the earlier article,[2] this organization has during its existence produced nearly 50 per cent of the finished rolled steel of the country. While the proportion changes slightly but appreciably from year to year, the variations are not sufficiently noticeable to indicate any

9. The percentages cover average annual changes in the number of employees on all properties of the Steel Corporation. The employees are grouped in the reports of the company into those employed in manufacturing properties, in coal and coke properties, in iron-ore properties, in transportation properties, and in miscellaneous properties. About 70 to 75 per cent of the entire number of employees work in the manufacturing plants of the corporation.

1. Twentieth Annual Report of the United States Steel Corporation, 1921, p. 28.

2. Quarterly Journal of Economics, November 1923, pp. 5–7.

greater stability with respect to output, and therefore with respect to employment, than is the case with independent producers.[3] The fluctuations in the average number of employees as shown in the tabulation may thus be taken as fairly typical of the steel business generally.

The smaller percentage of average annual variation in the case of the number of employees, as compared with the country's production of iron and steel, shows that oscillations in trade do not affect employment in this industry to the same extent that they affect output.[4] In other words, a reduction in steel production is not accompanied by an equal diminution of the labor force.[5]

If figures comparable to those published by the Steel Corporation were obtainable for the industry as a whole, both before and after the establishment of that organization, it is reasonable to suppose that there would be a difference between the percentages of average deviation from our five-year moving average similar to that revealed in the case of the production of iron and steel. As changes in output are more marked than variations in the number of employees, the difference in average deviation between our two periods would in all probability be appreciably less. Conclusions with reference to employment, however, have to be drawn with reserve,

3. There was a noticeable increase in the proportionate output of rolled steel by the Corporation in 1921. The percentages for the years 1920 and 1921 were 41.60 and 50.46, respectively. Such an increase would tend to make the reduction in number of employees in 1921 by the Steel Corporation less than for independents. Wire nails, which were not included in the rolled products, showed a reduction from 53.98 to 48.07 per cent, and tin and terne plate an increase from 45.11 to 48.87 per cent. The year 1921, however, is exceptional.

4. The ratio of variation between the country's output of steel ingots and castings and the number of employees in the industry, assuming the same variation as indicated by the figures for the Steel Corporation, and using the fluctuations in output as subject and those for employment as relative, would be about +0.6.

5. The manufacture of tonnage steel, like the railroad business, is characterized by a large fixed investment. The proportion of constant to variable costs is large, and many of the variable costs, like labor, are not proportionate to volume of business. The law of increasing returns applies to the steel industry as it does to railway operation.

not only on account of the limited data available, but also on account of the possible effect of strikes and lockouts on the number of workers employed.[6]

The fact that fluctuations in iron and steel output, and probably in the number of workers in the steel plants of the country, have been greater in the years following the organization of the United States Steel Corporation than in the preceding years, and that therefore these greater variations have prevailed in a period of attempted price stabilization, involves no condemnation of the Corporation or of its price policy. Neither do the results of our statistical investigation imply that price stabilization must in the long run be accompanied by increased instability of production and employment. In the discussion of the price policy of the Steel Corporation,[7] as reflected in weekly and monthly quotations for the principal articles of steel manufacture, it was shown that this policy has been characterized by moderation and by an absence of effort looking toward monopoly control. The increased fluctuations in the second of our two periods are but an illustration of the close relationship existing between output and prices. If prices are to be maintained at comparatively fixed levels, production must respond to market changes with more promptness and to a greater degree than where the prices themselves respond to these changes. In other words, a price policy is inevitably bound up with output regulation or adjustment.

There are some features, however, of our tabulations which may justify the confidence felt by some that price stabilization in the long run does operate to bring about some industrial stabilization. The fluctuations in pro-

6. As is well known, trade unions other than company unions are not recognised by the Steel Corporation. In the early nineties trade union influence was powerful in the steel business. Strikes were also frequent and in some cases widespread. They have been less prevalent since the organization of the Steel Corporation.

7. Quarterly Journal of Economics, November 1923.

duction which have been discussed are annual variations from a five-year moving average. The effect of these changes in preserving business prosperity and warding off commercial crises, which are usually associated with violent price movements, is not, of course, shown by measurements of this character, and indeed would be difficult to demonstrate statistically with any degree of precision at all.

Attention has already been called to the fact that in the period following the organization of the Steel Corporation extreme deviations from our mean are especially marked, and represent for the most part sharp curtailments in production during years of depression. In the period antedating the formation of the Corporation such deviations are either absent or very few in number, and are as likely to represent pronounced increases as reductions in output. Another feature of these extreme variations in the period after 1901 is that drastic curtailments of output during years of depression are almost invariably followed by a prompt recovery to normal production. Thus in 1908 the output of steel ingots and castings was reduced 36.7 per cent and that of rolled iron and steel 36.1 per cent below the moving averages for that year; but in 1909 the production was 7.8 per cent and 6.8 per cent, respectively, in excess of the normal output for each. Similar recoveries took place after the depressions of the years 1904 and 1921.

When the actual figures for these years of reduced output are compared with those of the years immediately following, the significance of this prompt recovery can be better appreciated. The production of steel ingots and castings increased from 13,859,887 tons in 1904 to 20,023,947 tons in 1905. In 1908 it fell from the 23,362,-594 tons of the preceding year to 14,023,247 tons, but rose again in 1909 to 23,955,021 tons. The enormous

production of 42,132,934 tons in 1920 was succeeded the following year by an output of only 19,783,797 tons. In 1922, however, it increased to 35,602,926 tons, which was over 5 per cent in excess of our five-year average. In other words, the sharp reductions in output in years of depression were quickly followed by a return to normal business operations and to seemingly accelerated growth. There was no tendency, after a year of greatly diminished production, for the depressed condition to continue any considerable time before revival set in. Of course, other influences affecting industrial and social growth have contributed their share in recent times toward reducing the duration of periods of depression. The rapidity, however, with which business recovery takes place in the iron and steel industry is seemingly associated, to some extent at least, with a general price policy which experience has apparently proved to be a factor in any permanent financial prosperity.

It is also noteworthy that if the years in which the larger departures from our moving average in the direction of reduced output took place are eliminated, and our norm computed on the basis of the annual production for the remaining years, the percentage of average deviation is almost cut in half in the period succeeding the establishment of the Steel Corporation, whereas it is but slightly reduced, if at all, for a corresponding number of years preceding.[8] We may take as an illustration steel ingots and castings. Since 1901 the country's output of steel in these forms was reduced more than 20 per cent below our five-year average in 1904, 1908, 1914, and 1921. Tabulating our figures for the period since the organization of the Steel Corporation, with these years

8. An exception to this statement is the case of iron and steel rails. Even in the case of rails, however, the change in percentage would not be very great. For reasons already indicated, the fluctuations in rail output have been influenced by conditions outside of the steel trade that have made the variations at certain periods somewhat different from those obtaining in the cases of other iron and steel products.

eliminated and our moving average computed on the basis of the remaining years, the results are as follows:

VARIATIONS IN THE PRODUCTION OF STEEL INGOTS AND CASTINGS SINCE 1901 WITH THE YEARS 1904, 1908, 1914, AND 1921 ELIMINATED

Years	Production (thousands of gross tons)	Five-year moving average (thousands of gross tons)	Deviation (thousands of gross tons)	Percentage of deviation
1902	14,947	14,634	+ 314	+ 2.1
1903	14,535	17,276	−2,741	−15.8
1905	20,024	19,253	+ 771	+ 4.0
1906	23,398	21,055	+2,343	+11.1
1907	23,363	23,366	− 3	− 0.0
1909	23,955	24,097	− 142	− 0.6
1910	26,095	25,668	+ 427	+ 1.7
1911	23,676	27,256	−3,580	−13.1
1912	31,251	28,895	+2,856	+ 8.8
1913	31,301	32,231	− 930	− 2.9
1915	32,151	36,507	−4,355	−11.9
1916	42,774	39,150	+3,624	+ 9.3
1917	45,061	39,825	+5,236	+13.2
1918	44,462	41,820	+2,642	+ 6.3
1919	34,671	40,386	−5,715	−14.2
1920	42,133	38,494	+3,638	+ 9.5
1922	35,603	36,723	−1,120	− 3.0
Percentage of average deviation				7.5
Percentage of average deviation without elimination of any years				14.7

The elimination of the four years mentioned reduces the average deviation in the case of steel ingots and castings from 14.7 per cent to 7.5 per cent. If the years from 1880 to 1901 are treated in a similar manner, and the one variation below our moving average in excess of 20 per cent — that of 1885, amounting to 22.1 per cent — is eliminated, the average deviation for the period is increased from 10.2 to 10.7 per cent.[9] The comparative

9. This somewhat anomalous result is due to the fact that the output for 1887 was 20.1 per cent in excess of the mean for this year, and eliminating the figure for 1885 increases the mean for 1884, when the output was also low. The smaller deviations for the other years in the middle eighties were also increased. However, if the output for 1887, which was about 20 per cent in excess of our norm, is eliminated, the percentage of average deviation for the twenty-two years would be only slightly reduced.

results of eliminating extreme variations in output in the case of other iron and steel products are practically the same. It can be said, therefore, that in the second of our two periods extreme variations in the direction of reduced output influence the average percentage of deviation very materially; in the first, little or not at all. If these extremes are excluded from both of our periods, we should have in the case of steel ingots and castings an average deviation for the years 1880–1901 of 10.7 per cent, and one of only 7.5 per cent for the twenty-one years following.

The increased fluctuations in iron and steel production which we have noted in the period since the establishment of the Steel Corporation are apparently due to the need of adjusting output to price maintenance and conditions. In ordinary times these adjustments have not required very material variations from what would be regarded as normal production. In years when demand has been considerably slackened, adjustments in output have been immediate and drastic, but have apparently been followed by prompt recovery. It is in connection with the industrial effects of this immediate adaptation to market needs, particularly when prices tend to sag, that the policy of price stabilization can be advocated as a means of promoting industrial stabilization. In so far as this policy avoids prolonged periods of trade depression, with its inevitable and widespread diffusion of unemployment, it can be said to be conducive to industrial stability. And the general character of the larger variations from our five-year average with their sequences gives some support to this view.

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COMPETITIVE ILLUSION AS A CAUSE OF BUSINESS CYCLES

SUMMARY

Supplies come on the market, not as quantities available for sale, but as flow responding to demand, 632. — Manufacturers' usual practice is to "sell then make," not "make for stock," 634. — Details of the "sell-then-make" policy, 635. — The "make-for-stock" policy sometimes followed in part; its virtues, 636. — Connection of the sell-then-make policy with business cycles, 642. — Demands from distributers bring response in production, 642. — If products are not forthcoming, orders are exaggerated or duplicated, 645. — False demands lead to overenlargement of supplies, 647. — Reaction. Alternate exaggeration and understatement of consumers' demands, 648.

THE behavioristic theory of business cycles developed by Lawrence K. Frank [1] is interesting and suggestive. I believe that it contains a large proportion of truth. However, it exhibits rather too much the attitude of a scientist observing from a detached point of view the behavioristic habits of business men and drawing inferences therefrom, without being able to enter into their mental processes and emotions, or to gain a sympathetic understanding of the motives that actuate them and of the deceptions to which they are subjected under the system of competitive private initiative. The object of this communication is not to criticize adversely but to correct and supplement. The following remarks represent the reflections on observations made and experience gained during several years of intimate contact with many of these behavioristic business men, myself participating in the handling of their problems.

1. Quarterly Journal of Economics, August 1923.

While there are all sorts of ideals stimulating business men or constituting the restraining rules of the game, the primary motive of those who conduct business is profit-making. Profit is the excess of money income over its money cost of acquisition. It is that increase in the cash funds of the venture that results from, or tends to result from, the acquisition or production of commodities or services at one set of prices, called "costs," and selling them at a higher set of prices. Profits are intimately related to sales. Granted a margin of sales price over total cost to acquire, sell, deliver, and collect, the greater the volume of sales the greater is the profit. Not only so, but because of the presence, in the list of costs, of a considerable portion of fixed or relatively inflexible costs, sales beyond a certain volume will be profitable where sales in less volume would mean a net loss. Production alone, however, cannot produce a profit. Production in large volume, even tho it bring low average cost per unit made, will not produce a profit if any considerable portion of the output proves unsalable at remunerative prices. In consequence, the rate of production is conformed closely to the rate of demand.

Supply and demand are customarily discussed as if they were quantities of commodities offered for sale at a given moment and quantities wanted by would-be purchasers at the same moment. They are more properly to be considered as rates of flow of commodities and services from the industries per week, per month, or per year, and the rates at which they are wanted. The supplies, or production, of the various commodities may be likened to streams rising at the natural resources and flowing through the channels of the productive and distributive processes to the ultimate purchasers. The rates at which these ultimate purchasers draw the commodities away from the mouths of these streams con-

stitute the ultimate demands for them. The very streams themselves, however, constitute in an important sense the intermediate demands; for in passing from industry to industry along the channel, the orders for materials and supplies of one industry constitute the demand for the products of the industries nearer the sources of the streams. Or perhaps it is better to say that demand, in the form of orders, is an impulse that travels from mouth to source of a stream, and results, or tends to result, in a flow of commodities through the production and distribution channel from source toward the mouth. The tractive impulse that is transmitted up the stream comes from the ultimate demand that draws the commodities away from the mouth.

This conception of supplies as flowing streams of commodities (and services), and demands as the tractive impulses that cause the streams to flow, is appropriate because in practically all business except crop-farming (which is a life, not a business) the movement of commodities in production, transportation, and wholesale distribution comes in response to demand. Outside of agriculture, metal mining, the fisheries, and retail trade, probably the greatly preponderating portion of all production is carried on to fill orders received. In rendering retail service, it is true, the merchant usually finds it necessary to carry stocks of merchandise from which promptly to fill his customers' orders.[2] Even these merchants, however, watch their rates of sales and their stocks carefully and govern their re-orders according to the rates at which the respective goods are being purchased by the customers. Retail buyers must be "keen judges of values." That is, in selecting commodities for

2. Stove retailers, in certain sections of the country at least, carry only samples and buy from local wholesalers only to fill their customers' orders. Many automobile retailers also only carry samples in stock and order from the factory after receiving the customer's order.

purchase they must be keen to pick those which, at the prices that must be asked to afford a probable margin of profit, will sell rapidly enough to afford a quick turnover of the investment and a satisfactory profit. Rapid turnover at a good margin of profit is the aim. The slow sellers are not re-ordered. The rates of sale of the good sellers are closely watched, re-orders are accommodated thereto in size and frequency, and when the rates of sale begin to dwindle, re-orders are made in smaller amounts and less frequently. Every merchant knows that the profits of one period may later be swallowed up in losses necessitated by selling unmovable inventories at a sacrifice.

Thus retailers' orders are conformed closely to the rates of demand. The same thing is true of wholesalers' orders. With manufacturers, sales for the most part precede fabrication. As a student of economics in college, the writer carried the impression, perhaps originating out of his experience as a farmer's son and his observations of the stocks of merchandise on the country general storekeeper's shelves, that business men produced stocks of goods and then sold them if they could. Much economic discussion seems to be conducted on the basis of this naïve assumption. The writer's personal contact with five different manufacturing industries and observations of many others dispelled the illusion. The great majority of manufacturers "sell then make." Only in the case of a comparatively few staples is it considered safe to "manufacture for stock"; and even in these cases the desire to avoid the disadvantages of larger cost and slower turnover of investment that are involved in real production for stock are likely to result in production on practically the sell-then-make basis. With a large proportion of commodities, variety in design is so great, changes in fashion and technical design are so

rapid, that the only course of action that usually is considered safe is to get the orders first and manufacture afterward.

In the men's ready-to-wear clothing industry only one manufacturer, out of about one hundred and fifty in the writer's personal acquaintance, makes suits in any considerable quantity in advance of the receipt of the orders for them. Even this is confined to a single conservative model out of his repertoire, and to one standard good-selling style of cloth. One other manufactures a certain amount in advance of orders in the first half of the semi-annual season, by analyzing his first two weeks' sales orders and applying distribution percentages based thereon to his total season's orders of cloth, as estimates of the quantities that he will sell in each model, cloth-style, and size — the purpose being to plan his cutting and fabrication in large quantities. Before his manufacturing season is half over, however, his sales orders for the season have all been taken, analyzed, and compiled, so that any errors made in his original estimates are rectified. Nor does he hesitate to cancel orders for poor-selling fabrics and substitute orders for the good-selling ones. The others all analyze, classify, compile, and cumulate their sales orders, and originate manufacturing orders only for sales orders taken.

In the manufacture of electro-magnet coils, each customer's designs are special, in order that they may not only produce specific effects but fit properly into a whole mechanism. Furthermore, these designs are likely to change any day. Consequently the coil manufacturer would run the gravest risk if he produced in advance of orders received. The handkerchief manufacturer might produce a plain hem-stitched handkerchief for stock in certain quantities. Not so, however, the novelty and embroidered designs. Castings naturally are produced

only upon receipt of the customer's order. The fact that, normally, manufacturing takes place only to fill orders in hand is further evidenced by the familiar trade-paper announcements stating that the capacity of the plants of the United States Steel Corporation, or of any other company of national prominence, is booked for three, four, six, or some other specified number of four months ahead.

There is, it is true, a small but growing number of manufacturers who apply a policy of so-called production for stock. Examination of their mechanism and method of originating manufacturing orders, however, reveals, first, that even in their cases the rate of initiating production conforms closely to the rate at which sales orders are currently being received; and, second, that as a matter of fact the major portion of the manufacturing process is completed *after* the receipt of the sales orders to which the specific goods are applied. There is so much misconception of the real nature of the so-called "make-for-stock" or "make-then-sell" policy as actually applied, that a brief exposition bringing out this point is advisable. The following description of a standard routine of finished stock and materials record-keeping will repay the reader's careful perusal, in order that he may gain a concrete appreciation of the automatic mechanism provided for originating both orders to manufacture product and orders to purchase materials and supplies; also to gain a concrete and correct appreciation of just what so-called "manufacture for stock" means.

A standard form on which is kept the record of any specific variety of article, whether finished product, finished part, or raw material, or "auxiliary supply," contains a heading and a body, the latter consisting of four main columnar divisions. The heading contains the

exact name and descriptive specification of the article, the symbol by which it is known in all references within the organization, a "minimum balance," and a "standard order." The "standard order" is the quantity that is to be purchased in one lot, if the article is an article of raw material or "auxiliary supply"; or the quantity to be manufactured in one lot, if the article is a finished product or a standard part of a product of the organization. The "minimum balance" is the chosen limit below which the visible supply of the article is not to be let fall without issuing a requisition to purchase or manufacture the standard quantity. This "minimum balance" or minimum visible supply is not by any means necessarily a quantity of the article actually on hand, however. Just what it does mean will appear presently.

As before stated, the body of the record consists of four columnar divisions, which are as follows: (1) Materials on order, or the quantity ordered purchased or ordered manufactured, but not yet received in the storeroom; (2) materials in storeroom, or the quantity (and total cost and unit-cost) of the article that is physically on hand in the storeroom at the moment; (3) materials apportioned to orders (sales orders or manufacturing orders), but not yet issued from the storeroom; (4) "available balance" or "unapportioned balance," that is, the quantity of materials that are either on hand in the storeroom or have been requisitioned for purchase or manufacture, and that have not yet been allotted to any particular sales order or manufacturing order.

In order to bring out the point, it is necessary briefly to describe the operation of the above-described mechanism. Let a sales (or "shipping") order come to the keeper of this record. He makes out an order on the storekeeper — a "stores-issue" or "worked-materials-issue" ticket — for each variety of article called for on

the sales order, showing the symbol of the article, the quantity wanted, and the "Shipping Order" number for which it is wanted. He then "apportions" these "issues." He does this by entering the quantity in the "Materials-Apportioned" division of the record sheet, together with the "Shipping-Order" number and date, and adding the quantity to the previous total; and by deducting the quantity from the previous total or remainder in the "Unapportioned-Balance" division. If, however, the previous remainder in the "Unapportioned-Balance" division is less than the quantity being apportioned, or if, after apportionment, the resulting "Unapportioned Balance" is equal to or less than the "Minimum Balance" indicated in the heading, this record-keeper issues a requisition to purchase or manufacture (as the case may be) the standard quantity. He also adds this standard quantity, thus requisitioned, to both the remainder in the "Unapportioned-Balance" division and the previous total or remainder in the "Materials-on-Order" division.

This brings the total in the "Unapportioned-Balance" division of the record once more above the "minimum balance" limit. It is perfectly evident, is it not, that the resulting unapportioned balance is not in any sense an unapportioned or unallotted balance of the article *on hand*, free to be issued on fresh orders?

The final step in the process of apportionment described above is to compare the resulting total of "Materials Apportioned" with the quantity of the article in the storeroom as shown by the total or remainder in the "Materials-in-Storeroom" division. If the latter is not less than the former, the materials needed to fill the particular issue are "in stores," notation to that effect is made, and the "issue" may immediately be sent to the storeroom for issuance of the material for shipment. If

not, issuance must be deferred until a sufficient quantity of the article arrives in the storeroom to fill all orders taking priority and the particular order itself. It is obvious, however, that apportionment is not a process of allotting articles on hand solely, but of allotting articles in process of purchase or manufacture as well.

To complete the description of the routine, when the ordered materials or product arrive in the storeroom, the quantity is subtracted from the previous total in the "Materials-on-Order" division and added to the previous remainder in the "Materials-in-Storeroom" division. Then there is a comparison of the resulting total of materials in the storeroom with the quantities remaining apportioned to sales and manufacturing orders, and decision, guided by the "Order of Work," as to which of the waiting orders shall receive the materials.

The ideal size of the "standard order" is that quantity which can most economically be purchased or manufactured, as the case may be. In the case of materials used infrequently and in small quantities, however, or of product the demand for which is light and slow, the standard order will be made much smaller than the quantity that is most economical from the standpoint of purchase or production cost. This is done to avoid the disadvantage, in the form of greater storage and insurance costs and slowed turnover of investment, that is caused by "excessive inventories."

The ideal size of the "minimum balance" is the quantity of the article that will be used in the time required to get a standard order through the factory (including the planning) and into the storeroom, or outward to the source of supply and into the storeroom. This is the relationship that is needed to keep the factory constantly supplied with materials needed for work, or the shipping department constantly supplied with product

to ship to customers, without having an "excessive amount of capital invested in inventories." The more rapidly the article is being used, either in the factory or for shipment to customers, the greater must be the "minimum balance."

Thus, the more rapid the demand for an article, the greater must be the minimum balance and the more nearly will the standard order be made to conform to the most economical size. The slower the demand, the smaller must be made the minimum balance, and the further below the most economical quantity must the standard order fall. Also, the more rapid the demand, the more frequently will the standard order be repeated; the slower the demand, the less frequent the repetition of the standard order, whether for manufacture of the product or purchase of the raw materials and auxiliary supplies. Furthermore, the adjustments mentioned in the last sentence occur automatically, as will become evident after a moment's reflection relative to the automatic process of originating these orders described in the preceding paragraphs.

Thus it is seen that the rate of production of a commodity and the rate of ordering of materials and supplies needed in the production accelerate and retard as the orders for the commodity accelerate and retard, and that they do this automatically under the system of so-called manufacture for stock. The same is obviously true under the alternative system of manufacturing to order.

It is also evident from the foregoing description, that, while the manufacturing orders may be issued to maintain an "unapportioned balance" above a designated "minimum balance," and thereby be issued in advance of the receipt of the sales orders to which the specific units of the article are later applied, not only is this

"minimum balance" not necessarily a quantity of the article actually on hand at the moment, but long before the specific manufacturing lot gets through the factory, fresh sales orders will have wiped out the particular minimum balance, perhaps several times over. That is, the major portion of the production process takes place *after*, not before, the receipt of the sales orders to which the specific units of product are applied. Production still follows after demand in the major part, even under so-called manufacture for stock.

What then, you ask, is the virtue of the make-for-stock system? It has four virtues. Manufacture can take place in lots of economical size even tho sales orders are in lots of much smaller size. Materials and supplies can be purchased in economical lots, in time to supply them to the factory by the time they are needed, without carrying an excessive investment in materials. Orders can be filled a little more quickly than where production does not start until the orders are received. Finally, by deliberately interfering with the automatic mechanism so as truly to produce for stock during a regular annual or semi-annual season of slack demand, or during a depression, production can proceed at an approximately uniform flow, thus regularizing employment, building up stocks of finished commodities during the slack seasons by production at rates greater than demand, and letting them run down during brisk seasons by production at undiminished rates but less than the rates of demand.

The last, as intimated, involves a departure from the automatic mechanism previously described, and, if a standard policy, implies in its stead a system of *scheduled production*. Few concerns have achieved it.[3] With

3. Of course, many concerns under any manufacturing policy do some manufacturing for stock during slack seasons and depressions, in order to "hold the organization together"; but usually at much reduced rates and dispensing with the more easily replaceable personnel.

rapidly changing fashions and in depressions it is hazardous. The concerns that have achieved regularization of production and employment have done so rather through foresighted selling. Witness, for instance, the Dennison Manufacturing Company getting before Christmas of one year a considerable portion of its sales orders for Christmas novelties for the following year. These articles are produced for the warehouse, but certainly not in advance of sales orders received.

The foregoing exposition has been worth while if it has definitely established the following important propositions. (1) The movement of commodities through the productive and distributive channels takes place in large part after the demand is evidenced in orders and in response thereto. (2) The rates of production and distribution conform closely to the rates of demand. (3) The motives for this are the desire for profit, and the fear of loss if production and distribution are conducted on any other basis.

What has this to do with business cycles? Very much, as we shall see.

Let us start application somewhere along a cycle. The depth of a depression is a convenient starting-point. The rates of demand for commodities from retailers are at their lowest. Mr. Frank thinks that they are not much lower than at the height of prosperity; and the writer has seen large masses of evidence to the effect that *quantitively* he is right, altho not so, measured in money values. The recent depression may, however, be an exception in the latter respect. Nevertheless, whether the difference be great or small, demand rates are at their minima in the depth of a depression. The large number of people whose incomes are reduced through unemployment or part-time employment, as well as reduced rates, practically necessitate that. They have not the purchasing power.

Because of failure of consumers' demands upon retailers, the latter's demands upon manufacturers are also at a low volume. Mr. Frank intimates that distributers' demands upon manufacturers fall off much more than do consumers' demands, because for some reason the distributers have previously overstocked. The writer has seen large masses of evidence tending to support that claim also. The reason for it will be plainly apparent later. Whatever the reason, the demands upon the manufacturers are at their lowest levels. With the exception of a very few manufacturers who, through foresighted and energetic salesmanship, have been able to maintain their own sales orders, the rates of manufacturing are also at their minima, accompanied by smallest forces of personnel and probably by part-time employment, and resulting in lowest rates of orders for materials and supplies. Not only so, but stocks of materials on hand are at their lowest levels; so are quantities of goods in process — the reservoirs of work waiting ahead of each operation, for instance; so are the quantities of finished goods on hand, unless the manufacturers, as is likely to be the case with many, have resorted to production for stock in order to hold organizations together. The streams of production and distribution have dwindled and are at their lowest all the way along the channels from the natural resources down to the final distributive portions.

Now let retailers find themselves with inadequate supplies of merchandise. Perhaps this situation comes about in the manner suggested by Mr. Frank, namely, that consumers' demands had not actually been reduced nearly so much as retailers reduced their orders. What results? Retailers increase their rates of demand to conform to consumers' demands. Can manufacturers respond immediately? To the extent that they have been manufacturing for stock, yes.

It is quite likely, however, that for a considerable length of time the retailers' drain on manufacturers' stocks of finished goods will considerably exceed the rate at which these stocks can be replenished. For remember that probably the preponderating number of manufacturers normally make to order; and if they have been producing for stock, this, as before stated, is a slack season or depression fill-in, to hold the more valuable units of their organizations together. The first thing they do when demand revives is to dispose of their accumulated stocks and resume manufacture to order. Their operating forces are inadequate to meet the augumented rate of demand; and it will take many months to rebuild the productive organizations to their former number and efficiency. For, tho most of the old personnel exists somewhere, it has largely been scattered, and the additions to force must be newly trained, with all the wasteful experience of trying out five failures before finding one recruit who makes good.

Furthermore, they could not materially augment the production for many months, even if they had the trained personnel. For not only have their stocks of materials also been depleted, but, as before seen, the rivers of materials, all along the channels from their sources in the natural resources, have become shallowed streams. Only in the case of those relatively few producers scattered all along the courses, who have regularly followed the alternative policy of so-called manufacture for stock, would there be any slack in the form of stocks of materials or work ahead at the constituent processes. These, we have seen, are also likely to be smaller than normal, except for their stocks of finished goods at the beginning of the revival. And the manufacturers who follow this policy are such a small minority that their slack is likely quickly to be exhausted,

and they, too, will soon find themselves clamoring for both materials and additional personnel. Not until production has been augmented adequately at the sources in the natural resources, and not until this augmented flood has swept consecutively throughout the whole channel of production, can the rate of production flow adequately meet retailers' and consumers' demand.

What results from this situation? Retailers find that there is a shortage of merchandise at their sources of supply. Manufacturers inform them that it is with great regret that they are able to fill their orders only to the extent of 80 per cent; there has been an unaccountable shortage of materials that has prevented them from producing to their full capacity. They hope to be able to give full service next season, by which time, no doubt, these unexplainable conditions will have been remedied. However, retailers, having been disappointed in deliveries and lost 20 per cent or more of their possible profits thereby, are not going to be caught that way again. During the season they have tried with little success to obtain supplies from other sources. But next season, if they want 90 units of an article, they order 100, so as to be sure, each, of getting the 90 in the pro rata share delivered. Probably they are disappointed a second time. Hence they increase the margins of their orders over what they desire, in order that their pro rata shares shall be for each the full 100 per cent that he really wants. Furthermore, to make doubly sure, each merchant spreads his orders over more sources of supply.

Herein originates a large false demand upon manufacturers, and herein lies a great defect of our system of competitive private initiative in industry. The retail merchants themselves are likely to be greatly deceived as to the extent of the shortage in their supplies. For

the same prospective customers, disappointed in one store, are making inquiries at many other stores, and heighten the impression of demand at each. The retailers, in their turn, considerably exaggerate this demand, both by spreading their orders among more sources and deliberately including in their orders upon each source a considerable margin over what they expect to get. To the manufacturers this all looks genuine (unless they remember former experience and deliberately discount their customers' orders, which for a while would heighten the effect upon the latter).

The manufacturers, each frantically trying to increase his rate of production to fill these profitable orders, spread their orders in turn, and likewise provide a liberal margin of orders over what they expect to receive. In many lines of industry new manufacturers are enticed into the field, to get the attractive profits that opportunity seems to offer. They represent a new drain on the total labor force, and they swell the orders on the sources of supply of materials and become competitors for the remaining labor force. Thus the number of small manufacturers of men's and young men's ready-to-wear clothing in New York City was increased by about 400 during one season in 1919. Altho each did a profitable business for a while, it is likely that they did not augment the total rate of output of clothing one iota, altho they did materially increase the apparent demand for labor and for cloth.

The false demand is passed back, stage by stage, along the channels of production. It is even likely to be magnified as it goes. So that the apparent (and for the time being, very real) producers' demand upon the ultimate sources of supply in the natural resources comes to be very much larger than is actually needed to supply the consumers' actual demand, at current prices, for the

several specific kinds of commodities.[4] Not only that, but new production facilities are called into existence all along the channels. This in turn imposes a considerably augmented demand upon the industries that produce these facilities, notably the iron and steel and the construction industries.

What, in turn, is the natural result of this situation? Eventually the streams of production are not only enlarged but overenlarged. There comes a time when the ultimate sources of supply fill nearly all the orders of their customers. The latter are surprised to find their orders filled promptly and fully, and that they are receiving more than a plentiful supply of materials. There is no longer a shortage. Instead, owing to their previous overordering, there is a surplus. Their rate of ordering slows up a little, and the ultimate sources of supply find business not quite so brisk. The producers in the second stages also fill their orders promptly and fully, thus surprising their customers in turn. Result, orders upon the second stages in the production process slow up a little. And so on down to the retailers. The rivers of production have swollen so that the volume of flow is no longer insufficient to fill the apparent capacity of the market as evidenced in orders. Indeed, production has come to exceed the real demand, and the capacity of production organizations[5] thereafter ex-

4. In making this statement, the writer is well aware of the economists' claim that human wants are capable of unlimited expansion in number and variety, and that general overproduction is impossible. True; but the existing community's capacity to consume any particular variety of commodity — potatoes, for instance, or shoes, or suits of clothes — is physically limited. Furthermore, the demand at any given practical price is much less than the physical capacity to consume because of the preference for variety. So that, while it may not be possible to have general overproduction, if the production is properly apportioned and proper variety is offered, yet practically, through failure to meet the variety requirement, there can easily be overproduction of every commodity that is actually produced.

5. By "capacity of production organizations" is meant the capacity of the trained personnel, not the capacity of the fully manned plants.

ceeds the demand measured in terms of actual orders. The retailers awake to the fact that merchandise is coming in more rapidly than it is being sold.

This is the stage at which retailers find themselves overstocked. At this stage they cut down on their reorders from sources of supply, so as to work off excessive stocks and accommodate their streams of purchase orders to their streams of sales. This is the situation, also, in which many retailers cancel unfilled orders with their sources of supply. The concern with which the writer was connected in the summer of 1920 suffered cancellations to the extent of about 10 per cent of its season's orders. The cancellations received by a number of manufacturers of men's ready-to-wear clothing amounted to about half the orders previously received for the semi-annual season.

The foregoing exposition would account for an overstocking of retailers even if there were no diminution in their rates of sales. Mr. Frank seems to think that consumers' demands do not fall off appreciably. I am inclined to believe, however, that consumers' demands do fall off a short time before the retailers are so disagreeably surprised to find their orders so fully and promptly filled. Consumers' demands would naturally increase for a while because, on account of the change from part-time to full-time employment, to the reduction in the number of the involuntarily unemployed, and to the higher wage rates that have resulted from the keener competitive bidding for personnel, they have had a greater aggregate purchasing power with which to sustain demand, even at somewhat higher prices. However, in the apparent shortage of supply, prices have risen more rapidly than have the wage and salary rates of a very considerable portion of the consuming public. Retailers, manufacturers, and other producers alike

take advantage of a shortage or an increased flood of orders to advance their prices. It has been the prospect of profit on this increased flood of orders, not at the old prices merely, but at the advanced prices, that has stimulated producers to such strenuous efforts to increase their productive capacities; that has caused them to bid up hiring rates and yield to their employees' demands for higher wage and salary rates in the keener competition for labor force. Once made, these advances in wage rates, without securing an increased but perhaps causing even a decreased output per man-hour, have even necessitated higher prices. But the prices have risen more than have a large portion of wage and salary rates.

Hence, in spite of their increased money incomes a great mass of consumers have continued to feel, in fact or fancy, the pressure of the "high cost of living." Furthermore, each person resents the increases in the prices of the commodities he buys. Whether or not he has greater means in like proportion, his tendency is to slow up his rates of purchase of those commodities for which his demand is fairly elastic. He wears his clothing longer before discarding, resoles his shoes a greater number of times, and so on. Hence, because of a resistance to the increased cost of living, reasoned or unreasoned, reasonable or unreasonable, the higher price level does, I believe, bring a slackening in the consumers' demands for those commodities for which their demands are elastic.

Thus in many lines the retailers find themselves caught between two forces, namely, too prompt filling of their orders and failing demand. The result is, as we have seen, diminished orders upon their sources of supply and — cancellations.

These dwindling orders and these cancellations naturally alarm the manufacturers. Much of their ex-

panded production has been financed by temporary loans from the banks. Failure of their customers to take the merchandise they have ordered threatens the manufacturers' ability to meet their obligations. Credits become "frozen." A critical situation develops, in which anxiety and alarm are the dominating emotions. Furthermore, the manufacturers' orders on their sources of supply also dwindle, both because of diminished needs and because of desire to conserve financial resources; and considerable cancellations of existing orders are not unlikely. Thus the alarm and the diminution of demand impulses are transmitted backward along the channels of production, to augment the effect of the first plethora of goods that swept down the channels. Depression follows.

Along with this failure of orders there has gone, of course, a dwindling of production at each stage in the industrial process. To the extent permitted through lack of labor-union resistance, the producers immediately lay off their least valuable employees. This contribution to the involuntarily unemployed, cutting off their incomes, reduces the flow of purchasing power to the masses of consumers and still further impairs consumers' demands. This may or may not immediately react to cause a further reduction in orders upon producers, according to whether or not retailers still further diminish their orders. Eventually, however, it is likely that even with their reduced personnel manufacturers will be operating only part-time, thus still further decreasing the flow of purchasing power. The point sought to be made is that the displacement of employees accentuates depression. Employers collectively, in laying off their employees, "lay off" also the demand for their products.

If the preceding exposition is correct in the main, the

underlying causes of business cycles are the following. (1) Because of the length, in time, of the whole production process from the natural resources to the ultimate consumer, and the length of time required for selecting and training personnel in building up a production organization, production rates that have fallen below demand rates cannot quickly be augmented to equal the demand rates, but require many months to be so augmented. (2) There is deception and illusion all along the line as to the real extent of demand, due to over-ordering by customers. (3) The illusion is accentuated under our atomistic competitive system by counting the same demand several times over as it is presented to different atoms in the industrial organization. All three operate together to produce a grossly exaggerated measurement of demand in the boom period, followed automatically by a crisis and by a gross undermeasurement of demand during the crisis and depression; and that followed automatically, in turn, by another boom. Consumers' psychology, manifested in the form of resistance to the rising cost of living and a slowing-up of their demand near the end of a boom period, accentuates the effect of the superabundance with which the merchants' orders for goods are eventually filled, and materially assists in precipitating a crisis. The cyclical movement, once started, tends to complete and repeat itself automatically and perpetually.

I might go on to make particular application to the situation that developed in 1919 and the spring of 1920. I might set forth the special conditions that caused the tremendous boom of the former year, or those that especially operated to precipitate a crisis in the second half of 1920. I might describe the state of mind in 1920, whereby, prices having commenced to toboggan, there was no visible bottom to the slide. However, this com-

munication is already quite long enough. If I have succeeded in making the point that alternate gross exaggeration and gross understatement of the real consumers' demands are almost inherent in our unintegrated industry under competitive private initiative, I have accomplished enough for one effort.

In making this point, I am not advocating abolishment of the competitive system; any alternative system may have as grave defects of its own. I have merely pointed out a set of observed facts that appeal to the reason as constituting the explanation of business cycles.

THOMAS WARNER MITCHELL.

FEDERAL TRADE COMMISSION.

THE IMMIGRATION LAW OF 1924

SUMMARY

Four periods in the history of immigration policy, marked by the years 1830, 1882, 1917, 654. — The act of 1917 and the literacy test, 656. — The act of 1924 and the forces back of it, 659. — Its provisions, 660. — The Japanese question, 664.

THE United States has never had an immigration policy in the strict sense of the word. We have never deliberately thought out and determined in advance just what we wanted to get out of immigration, or just what service it was our duty to render to other nations through immigration, and then enacted laws designed to achieve these benefits or to fulfill this obligation. Our immigration legislation has been distinctly opportunistic. Nevertheless, it is possible, looking over the series of acts by which our immigration law has been built up, to detect a certain logical consistency, an orderly progression in a fairly definite direction. This consistency represents the reactions of a reasonably intelligent and well-informed self-governing people to the successive phases of a great social phenomenon, the dominant motive being always the self-interest of the people itself. The features and significance of the immigration movement have altered with the social evolution of the United States and other (particularly European) countries. The public opinion of the United States has changed in accordance with the changes in the immigration situation, and legislation, with a very pronounced lag, has been enacted in response to public opinion. American immigration legislation, therefore, has been built up in conformity with the natural trends

of the immigration movement during the past century and a half. The outstanding feature of these trends has been the necessity of increasing control by the receiving country.

Looking back over the legislative history of immigration since the beginning of our national life, it is now possible to distinguish four quite well-defined periods. With the exception of the second, the beginning of each of these periods can be conveniently designated by a definite date in accordance with a specific piece of legislation. Even in the case of the exception, the dividing line can be fixed more definitely than is usually the case in social transitions.

The first of these periods may be called the Period of Free Immigration, extending from the beginning of our independent national life to 1830. While there was a good deal of feeling against foreigners at times during this period, as exemplified in the Alien Acts, it was not strictly a feeling against immigration, and no attempt was made by any governmental agency to exert control. The action of the Federal government in beginning to count immigrants in 1820 has given a prominence to that date which it hardly merits except from the purely statistical point of view.

About 1830, however, a distinctly new attitude toward immigration began to manifest itself, quite suddenly. This date may, therefore, be taken as the beginning of the second period, which may be called the Period of Agitation and State Control. It is marked by very vigorous demands on the part of the American people, animated by the accumulating burdens imposed on them by poor, sick, insane, and criminal foreigners, that Congress should set up some measures to control the quality of the immigrants. As Congress was very sluggish in responding to this demand, various states, par-

ticularly on the Atlantic seaboard, tried to meet the situation by laws of their own. All of these were eventually declared unconstitutional, but they are important as evidences of the development of sentiment, if not as means of actual control.

The third period, the Period of Individual Selection, begins with the first general Federal immigration law in 1882. The two distinctive features of the law are that the Congress of the United States for the first time undertakes to exercise some control over the immigration stream, and that this control takes the form of weeding out certain undesirable elements on the basis of their personal qualities. During the third period this principle remained the dominating feature of legislation, and the section enumerating the excluded classes was the backbone of the immigration law. The regulation of immigration during this period was exclusively qualitative.

During the third period — antedating it, probably, as far as origins are concerned — there developed rapidly a feeling of opposition to immigration on quantitative grounds. The conviction became widespread that it was not enough to guarantee the high quality of the individual immigrant, regardless of numbers, but that there was a menace in too great a volume of even the best immigrants. There also developed, very vaguely at first, a realization that there was a great difference in the quality of the various immigrant groups judged by their assimilability in American life and their effect on American institutions. This sentiment corresponded to the shift from the "old" to the "new" immigration during the closing years of the last century, but was only beginning to take definite form at the time of the outbreak of the World War. The demand for quantitative restriction, however, was well defined and vigorous by this time.

The demand for restriction, supported in a very minor rôle by the desire for the group selection of immigrants, was responsible for the passage of the literacy test in 1917. This much-debated addition to the law, while selective in form and defensible as a capstone to the enumeration of undesirable types, was really an expression of the demand for restriction, and got much, if not most, of its backing from those who wanted to see a limitation in numbers. It differed from other selective tests in the fact that it would affect a very large proportion of the ordinary immigration stream. Its significance as the entering wedge of a new principle of immigration control was so clearly recognized that three different presidents, one of them twice, regarded it as of sufficient importance to justify them in making it the principal ground for vetoing a general immigration bill the other main features of which they heartily approved. The group selective influence of the literacy test lies obviously in its tendency to favor peoples with a culture characterized by a high development of popular education. The year 1917, accordingly, rather than 1924, may be taken as the beginning of the fourth period, the Period of Group Selection and Restriction.

The literacy test was adopted in the midst of the war period, and we have never had an opportunity to see how it would have worked out under the conditions which ordinarily prevailed before 1914. By the time actual hostilities had terminated and the abnormal conditions of transportation and communication had partially subsided, public thought in the United States had moved far beyond the point where the literacy test represented anything like a final step in immigration control. This new attitude was in part a response to the extraordinary conditions which prevailed in Europe and the virtual certainty of an unprecedented flood of immi-

grants if the doors were left as wide open as the existing law permitted. To that extent the legislation which followed may be regarded as a war product. But it is important to recognize that the effect of the war was to accelerate a development which would have taken place in time anyway, much more than to deflect immigration legislation in a new direction. The country was moving steadily in the direction of restriction, and would have arrived eventually at the frank embodiment of the principle in legislation. The war hurried things up decidedly. Probably the war, with its emphasis upon nationalism, loyalty, and group solidarity, did more to develop the demand for group selection than for restriction. It revealed the alarming failure of assimilation in the past, at the same time that it emphasized the necessity of national homogeneity.

It was, therefore, quite natural that Congress, looking about for some means of averting the calamities which threatened through the alien flood, should regard favorably an expedient which would combine in a simple form the principles of restriction and group selection. Other proposals were put forward, such as complete suspension of ordinary immigration for longer or shorter periods. But that adopted was the one which would both restrict and select, that is, regulation on a percentage basis. The idea of percentage restriction was familiar to the immigration leaders of Congress, having been proposed by Senator Dillingham soon after the presentation of the report of the Immigration Commission, of which he was Chairman. It was also quite well understood by a considerable number of American citizens, largely as a result of the work of Dr. Sidney L. Gulick and those associated with him. Dr. Gulick's plan differed in details from Senator Dillingham's, but the essential principles were the same.

The restrictive quality of a measure for the percentage regulation of immigration depends both upon the elements of the population selected as base numbers and upon the percentage. The selective quality depends upon the basic elements alone, assuming that the percentage is uniform. Senator Dillingham proposed as base numbers the total numbers of all the foreign groups resident in the United States and enumerated in the Census. Dr. Gulick preferred the number of foreign-born naturalized and resident in the United States, together with their native-born children. Without lingering upon a comparison of these two plans, it may be said that the effect of both would be largely to increase the proportions of the annual total of immigration represented by the peoples of northwestern Europe and to decrease the proportional representation of southern and eastern Europe, assuming that all the quotas were filled. Broadly stated, the group-selective effect would be to favor the "old" immigration and to discriminate against the "new." The maximum total of any group would depend upon the base number selected and upon the percentage adopted; the actual immigration would depend upon this and a variety of other factors.

So urgent was the need of protection in the years immediately following the war, that Congress felt the necessity of passing some sort of restrictive measure without waiting for a thoro study of the problem, which would take some time. Consequently, in May 1921 a temporary law was passed which was to terminate a year from the end of the following June. Before the expiration of this period the law was extended in virtually the same form for two years more. We thus had immigration restriction on an emergency basis up to June 30, 1924. The base numbers adopted in these laws were the foreign-born representatives of each national-

ity resident in the United States and counted in the Census of 1910; the percentage was three; and nationality was defined as country of birth. Provisions were made for certain exempt classes outside of the quotas and certain preferred classes within the quotas. It was also provided that not more than 20 per cent of any quota could be admitted within one month. There was thus established, in effect, a monthly quota as well as a yearly quota, with the possibility of exclusion on either ground.

It was inevitable that a law so hastily prepared should contain many imperfections, some of which could hardly have been detected without the actual experience of administration. While the measure produced its main objectives in the way of limiting numbers and favoring the northwestern groups, there were many cases of individual hardship of the sort to attract wide attention and sympathy. These were assiduously exploited by the opponents of restriction, in the attempt to discredit the whole law. But Congress was satisfied that it was on the right track, and when, during the legislative session of 1923–24, it settled down to the task of drafting a permanent law, there was little tendency to abandon the percentage principle. The chief discussions revolved around the selection of base numbers and the percentages. The bulk of the American citizens, also, by this time were well convinced of the benefits of restriction, so that there was no very effective agitation for the complete abandonment of the principle.

Most of the actual contention about the bill, as it began to assume its final shape, was the result of differences of opinion — or of bias — as to how far we ought to go in the direction of group selection. The distinctive feature of this discussion, which marks it off sharply from that of any previous epoch, was the emphasis laid

on race and racial affiliations. The train of thought which had been given an impetus by the war accelerated rapidly, and the sentiment spread with amazing rapidity that our permanent policy should be to go much further than the temporary laws in providing that the immigration stream should correspond to the basic character of the American people before the onset of the "new" immigration. In pursuance of this sentiment the proposal gained ground to take the base numbers from the Census of 1890 instead of 1910, to say nothing of 1920. It was pointed out that this Census would apportion immigration to the actual racial composition of the American people today to a peculiar degree, giving a fair representation to the earliest immigrants and their pioneer descendants. This idea finally grew to the point where it was regarded as much more logical to base immigration upon the racial constitution of the present American people as a whole, than to base it upon the foreign-born elements of any decade. These facts account for some of the distinctive features of the law. Another expression of the desire for racial homogeneity is found in the clause proposing to exclude all immigrants who are ineligible to citizenship. This was interpreted to be aimed particularly at the Japanese, but literally applies to all peoples who are not included in the categories of white persons or persons of African nativity. This clause aroused an amount of heated discussion, quite out of proportion to any actual effect that it would have upon the character of the immigration stream.

These are the social forces, briefly summarized, which led up to the Act of May 26, 1924. The main features of the law itself are as follows. The quota principle of limiting immigration is retained. For the three fiscal years beginning July 1, 1924, the quotas will be 2 per

cent of the number of foreign-born individuals of each nationality resident in the United States as determined by the Census of 1890, nationality being determined by country of birth, with a minimum quota of one hundred for any nationality. This will mean a total immigration from Europe of about 160,000 a year. After July 1, 1927, the total of all the quotas is fixed at 150,000 annually, and this total is to be distributed among the different quota nationalities in the proportions which the inhabitants of continental United States having each national origin in 1920 bear to the total population in 1920. In other words, a total permissible immigration of 150,000 is to be distributed according to the original nationality of the various stocks which composed the population of the United States in 1920. This analysis of population according to national stocks is evidently a highly technical task. The law provides that the basis of nationality shall be primarily geographical, and entrusts the details of the determination to the Secretaries of State, Commerce, and Labor, assisted by the Bureau of the Census. This determination, when proclaimed, is to be virtually final and unassailable except in the case of proved errors of fact. The quota provisions do not apply to persons born in the countries of the Western Hemisphere, broadly speaking. Natives of these countries are included among the classes designated as "non-quota immigrants" which are not subject to numerical limitation. The principal other types included in the non-quota definition are the unmarried child under eighteen years of age, or the wife, of a citizen of the United States; former immigrants returning from a temporary visit abroad; ministers, professors, and *bona fide* students at least fifteen years of age.

In the administration of the quota principle a very important and salutary change is made. This is accom-

plished through a provision for "immigration visas," which in the case of immigrants take the place of the usual passport visas. These are to be issued by American consular officers in foreign countries upon application by the immigrant. They constitute the immigrant's permission to enter, so far, and only so far, as the quotas are concerned. It is provided that no more visas shall be issued in any fiscal year to persons of a given nationality than the quota of that nationality, and not more than 10 per cent of the quota in any calendar month. Thus the numerical restriction is secured by counting visas abroad instead of by counting immigrants at the American ports of entry. This should put a final end to the tragedy of excluding immigrants at our stations because of the exhaustion of their quotas, and should also stop the congestion of immigration in the first months of the fiscal year, and the consequent races of steamships. Other provisions of the new law designed to do away with the separation of families sometimes incurred under the temporary law are connected with the determination of the nationality of a minor child or wife of an immigrant. Briefly stated, the nationality of a child is to be determined by that of his parent if the latter is admissible, and the nationality of a wife, if inadmissible for quota reasons, may be determined by that of her husband if admissible.

In fact, every possible precaution is taken to eliminate not only the hardships experienced under the temporary law but also those consequent upon exclusion under the old general law. The most important step in the latter direction is taken by conferring power upon consular officers abroad to refuse immigration visas if the statements made by the immigrant in his application or contained in other papers submitted, or any other information possessed by the consular officer, lead him to

know or believe that the immigrant is inadmissible. Thus the most important features of inspection abroad, which has been so insistently demanded for several years, have been established. The power of the consular officer, however, is not that of an immigrant inspector; he can exclude, but he cannot admit. The visa simply gives the immigrant the right to apply for admission, with the assurance that he will not be excluded for quota reasons. But he still has to undergo all the tests and examination at the hands of the inspectors which the old law provides. Nevertheless, the ratio of exclusions at American ports should be reduced to a small fraction of what it has been.

As the validity of a visa may extend for a period up to four months, it is possible that the annual immigration may fluctuate slightly above or below the total annual quota. The quotas refer to visas, not to immigrants admitted. Some visas may be held over the end of the year in which they were issued — almost certainly will be, in fact. But this will not affect the average over a period of years. One other feature of the main body of the law which should be noted is that preference is to be given up to a certain extent to members of the immediate families of citizens, and to skilled agriculturists and their families. Another portion of the law is devoted to provisions for controlling the entry of alien seamen, which, while very important, do not call for detailed description.

There remains that brief portion of the law which refuses admission to alien immigrants ineligible to citizenship. This section was so thoroly exploited during the discussion of the bill that its provisions are probably familiar to those who are interested in the question at all. A word of interpretation, however, may be in place. As already observed, this clause should be thought of as

one expression of the demand for group selection with the intention of preserving the racial make-up of the American people as near to what it was at the time of the Revolution as is now possible. It should also be regarded as an expedient, thoroly justified in principle in a permanent statute, for bringing our immigration law into consistency with our naturalization law. Both express the determination that the United States is to be a white man's country. This determination has been inherent in American thought from the very beginning, and has been previously expressed in the Chinese Exclusion acts and the "geographical delimitation clause," which together have excluded most of the representatives of the yellow and brown races with the exception of the Japanese. Certain illogical departures from this principle have been necessitated by the presence in our midst, through no choice of their own, of large numbers of Africans. It will help in the just judgment of this section of the law to remember that its effect is not to put the Japanese into a class by themselves, but to cease to give them a unique legal position, and to put them into the same category with the rest of the non-white world.

Finally, it should be noted that the Act of 1924 is in addition to, not in substitution for, the previous immigration law. All the former provisions for individual and group selection are retained; new forms of group selection and genuine restriction are added.

The various votes on the bills in both houses of Congress show an overwhelming demand for legislation of this character, in so far as Congressional votes are a reliable evidence of public opinion. The flurry over the Japanese question undoubtedly accentuated the feeling in certain instances. But it probably had relatively little effect on the final line-up on the bill after it came

out of conference. The final votes were: Senate, 69 to 9; House, 308 to 58. A final piece of evidence is furnished by President Coolidge's signature, attached to the bill in spite of his strong feeling on the section affecting the Japanese.

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REVIEWS

NEW BOOKS ON THE PRINCIPLE OF POPULATION [1]

Of the five books here under review, the first three can be regarded as efforts to contribute to our knowledge of the theory of population. Each of the other two is an endeavor to survey and summarize our present knowledge of the theory. In the first group, that most recently published, Professor East's book, *Mankind at the Crossroads*, deserves earliest consideration, because it is most nearly an attempt to discuss the problem of population in the twentieth century in all its economic aspects. On the other hand, Mr. Harold Wright's *Population* raises so many more points of importance to the economist that its masterly treatment of the whole subject requires very special indication at the beginning. Indeed, it is discussed at the end of this review only because of its very completeness. Professor East's book is taken first because it contains so much more, both good and bad, than the books of Mr. Cox and Mr. Carr-Saunders.

Mankind at the Crossroads falls easily into two main parts. The first consists of chapters 3, 4, 5, and 6, entitled respectively "Retrospects and Criticisms on the Growth of Peoples," "The World Situation in Population, and the Food-Supply," "Racial Prospects and Racial Dangers," "Permanent Agriculture, Population Restriction, and National Progress." Tho many matters are discussed in these four

1. Mankind at the Crossroads. By Edward M. East, Professor in Harvard University. New York, Charles Scribner's Sons, 1924.
The Problem of Population. By Harold Cox, Editor of the Edinburgh Review. London, J. Cape, 1922.
The Population Problem. By A. M. Carr-Saunders. Oxford, Clarendon Press, 1922.
Population Problems. By E. B. Reuter, Ph.D., Associate Professor of Sociology in the University of Iowa. Philadelphia and London, J. B. Lippincott Co., 1923.
Population. By Harold Wright, M.A., Pembroke College, Cambridge. New York, Harcourt, Brace, and Co., 1923.

chapters, in no very regular fashion, the main line of thought is this: that we now possess a knowledge of the agricultural resources of the world, of the present-day population of the world and its present rate of growth, sufficient to show that all the resources will be brought into service at no very distant time and that the population of the world, no matter how big it then may be, will be incapable of any further expansion.

The second part of the book consists of chapters 7 to 11; the titles of these chapters are "The Rôle of Death in the Drama of Life," "The Relation between Birth Restriction and the Public Health," "The Significance of the Declining Birth-Rate," "The Birth-Rate and Social Progress," "The Welfare of the Family." The main point discussed in them appears to be the nature of the checks that operate to control the growth of population at the present time, and our need to replace them in a civilized society by others more equable and efficient. An examination of the index shows that, next to Malthus, the authority most frequently cited is Professor Pearl. Professor East therefore will, no doubt, freely pardon the surmise that, in this part of the book, some parts of the argument have been guided by Professor Pearl's opinions.

In the first part of the book, Professor East surveys the world, country by country, and gives his opinion that with "a standard of living on a parity with what is found in the more densely populated countries of Europe . . . a reasonable maximum for the world's future population is one person for each two and a half acres of 40 per cent of the land area of the globe. This gives a figure of 5,200,000,000, a population which at the present rate of increase would be reached in just a little over a century." This opinion he delivers after the consideration of evidence which is given only in very summary form. Thence he proceeds in turn to a mention of the needs of Europe, and the food-producing capabilities of Australia, Canada, India, and Argentina. Australia and Canada are given about thirty years more as food-exporters, Argentina forty. For India he makes no prediction. Finally, he considers the agricultural potentialities of tropical Africa

and South America, and of the Arctic lands. To illustrate his points, he gives us a map of the world, which shows us the regions of arable land of the world. The equatorial regions of Africa and South America are indicated as tropical arable land. In the temperate arable lands are included India, Indo-China, the East Indies, northern Australia, and Central America. Siberia is entirely omitted.

Without prejudice against the form and purpose of the main argument, it is necessary to make comment on some of the specific statements that it contains. The official estimate of the extent of agricultural land in Canada is 440,000,000 acres. Professor East cuts this down ruthlessly to 150,000,000 acres of arable land. Taking for granted enormous exaggeration in the former figure, would it not have been well worth while to give some support to this conclusion by a statement of the arguments? Against his description of the population of India as "millions of squalid people, densely ignorant and unspeakably filthy" and against his absolute disregard of Siberia, both in map and in text, one can only raise a vigorous protest. His treatment of tropical South America is lacking in precision, because he does not make a sufficient distinction between the very different regions to be found in it. Discussing tropical Africa, he singles out the Congo Basin for special appreciation. All previous charges made against its climate are brushed aside with the statements: "It is said to be relatively healthy even now, when it has had little of the hygienic touch of modern science," and "The rainfall is between 40 and 80 inches, making it a potential garden. It teems with wild riches, both animal and vegetable." On these grounds, the Congo region and its tropical neighbors are declared to present the greatest remaining opportunity for white colonization. Latin Europeans, it is said, will be able to thrive on the higher lands as they have already thriven on lands of similar elevation and latitude in Brazil.

This last opinion is conjectural in a high degree. Two strong objections may be raised against it. Even if the climate is sufficiently favorable to allow Europeans to make a permanent home, it does not follow that it will permit them to

work on the soil as they work in temperate lands. But, supposing that they succeed in doing so, they will encounter in the soil itself a second obstacle to the establishment of a system of agriculture. Professor East will find in a book by a Harvard colleague — *Climate*, by Professor Ward — a very positive condemnation of tropical soils on the count of their poverty. The heavy tropical rains wash from them a very large part of the inorganic constituents required for plant growth. And also, according to Dr. Willis in his book *Agriculture in the Tropics*, bacterial action, proceeding rapidly at these high temperatures, reduces to very small proportions the organic content of tropical soils. Professor East describes tropical Africa in a way that is both optimistic and picturesque, and in view of the general uncertainty about these lands, much latitude must be allowed to him in the expression of his opinions. It is possible only to raise arguments on the other side, and then to await enlightenment.

In discussing the utilization of the Arctic regions, he is careful to give good warning against false hopes, on the ground of what he describes as botanical, geographical, and certain practical reasons. He gives, however, but one of these reasons, and that, unfortunately, one of the most uncertain. It is this, that "plants take in and elaborate their crude food materials during the day, but they do most of their growing by night." Certainly there is experimental evidence in support of this view. But is it right to ignore the special climatic characteristics of the Arctic regions? When to the length of daylight are added all the other factors of radiation, its intensity and quality, the temperatures of the soil and the air, and the humidity, the resulting complex of conditions goes far to modify and even counteract the working of what he sets down as a general law of plant growth. Other objections far stronger than this can be urged against the successful exploitation of the Arctic, and one can only regret their absence from Professor East's somewhat inconclusive criticisms.

In discussing the permanent bases of agriculture in the centuries to come, he begins with great insight by a discussion of mineral resources, and especially resources of mineral fuel.

From this he passes, by a rather abrupt transition, to a discussion of the agricultural prospects of the United States. He reviews in turn the possibilities of expanding the agricultural areas of the United States, of replacing agriculture by industrial photosynthesis, and of increasing the efficiency of agricultural production by the development of new crops and varieties. Under the first head, he argues that the calculations, somewhat modified, of Baker and Strong in the Yearbook of the Department of Agriculture for 1918, support very well Professor Pearl's prediction that the population of the United States will reach a stationary upper level of about 200,000,000 people. Under the third head, he offers an opinion contradictory to the statements made by Professor Russell Smith, in his *Food Resources of the World*. Here again, as in many other places, one can only regret that the space which the publishers placed at the author's disposal was not used in a more objective consideration of the problem in hand at the moment.

The possibility of industrial photosyntheses is assailed by the dictum that "Man has never been able to use energy mechanically with anything like the comparative efficiency of the lowly vegetable." This cryptic saying is elucidated thus: ". . . peas and beans, potatoes and wheat, use the energy of the sun in stimulating chemical reactions incomparably better than man is able to do. . . . We know quite a good deal today of the principles of thermodynamics, and there is not a single fact leading toward the belief that we shall ever be able to outdo the advantages these automata hold." That belief may or may not come true; in any case, the economist should be prepared for the possibility. The reasoning, at all events, is based on a statement which is no longer accurate. In June 1921 — *Mankind at the Crossroads* is dated 1924 — Baly, Heilbron, and Hudson published the results of successful experiments on photosynthesis which they had been led to perform as a result of thermodynamic reasoning. These results have been widely published in scientific journals, and have even received the flattering compliment of an unsuccessful contradiction. And there is a strong hope of further advances in the near future.

One other reference may be made in passing to Professor East's view of thermodynamics. The principle of the Conservation of Energy is not to be attributed to Mayer — whose name, by the way, should not be spelled Meyer. In the list of men who contributed to its establishment, he does not even deserve a leading place.

In order to compare the agricultural efficiency of different countries by "a really scientific method," Professor East uses some figures of crop productivity in various countries, which are given in the Yearbook of the Department of Agriculture for 1920 (page 815). They do indeed fulfil their compilers' purpose of comparing the productivity of different countries in the six crops, wheat, oats, barley, rye, corn, and potatoes; but since they omit from consideration all agricultural grasslands, temporary or permanent, hay-land and pasture, it is impossible to contend that they measure in any way the agricultural efficiency of the countries concerned. To say that they do so must appear to an economist the reverse of scientific. To get nearer to a scientific comparison that will suit our present-day purposes, it would be very much better to make a comparison of the quantity of food that is shipped away from each average acre of agricultural land to be consumed in towns or cities, due allowance being made, if possible, for farm-consumption of purchased feeds and fertilizers.

In the end, when he turns to the discussion of soil fertility and its maintenance, Professor East arrives at an unassailable conclusion. No one who reads his chain of evidence can fail to be aroused by a conviction of the serious problem that has arisen in our time, by reason of the heavy demands made upon the soil by large populations. In some uncertain way, it is true, his discussion of the problem of soil-fertility passes into a more narrow discussion; and as his first solutions for the problem of world agriculture he suggests the Agricultural Conference held at Washington in 1922 and the Farm Bureau movement organized by the Department of Agriculture. Only after he has run through a series of reforms which seem appropriate only to the present economic condition of agriculture in the United States, does he recur to the chemical

problem, in order to offer vigorously and decisively the only real and chemical solution that biological science can suggest — the return to the soil of all waste products of food production and consumption.

The argument in the second part of the book, dissolved out and crystallized down, is this. The lowest level to which the death-rate is likely to fall is one of 16 in a thousand, in a stationary population. Every effort should be made for economic and humanitarian reasons to bring it down to this level. One of the principal means to the desired end is a birth-rate of 16 to the thousand. Since the probable birth-rate of a freely growing population lies between 40 and 50, or even more, to the thousand, there should be established, as a recognized and universal custom, a voluntary restriction of the family sufficient to reduce the birth-rate to the necessary minimum level. If it is established now, the growth of population will have been checked at a reasonable economic level, and the world will thereby evade the wretched and otherwise inevitable alternative of a stationary population suffering from the pitiless operation of positive checks. Most unfortunately, this part of the argument is not discussed at length in any part of the book. Finally, from a restriction of the birth-rate many economic and hygienic disorders of modern life will disappear.

To those who are not acquainted with the problems of public health, this part of the book will appear both interesting and convincing in its treatment of these problems. To the economist, its value will be found in the fact that Professor East begins with a discussion of death and the death-rate, and proceeds to erect his argument on this foundation. Space lacks for further consideration of this part of his reasoning; a larger share of attention has been given to the earlier portion of his book because his opinions on world food-supply may perhaps be taken as authoritative.

We may now bring into review other aspects of the problem, which may assist the reader in evaluating Professor East's arguments and ultimate conclusions.

The Problem of Population by Mr. Harold Cox aids little in

any such analysis, because it does not contain any other consideration of the world agricultural problem than a statement of the law of diminishing returns. Just as Professor East pays special attention to the problem of population in the United States, so does Mr. Cox to that of the United Kingdom, and more especially to the growth of its urban and industrial population. For many reasons more complex than the simple need of food, immense urban groupings of population have grown up, wherein the inhabitants have imperiled, not so much their supplies of food, as their requirements of sunshine, health, cleanliness, and privacy. To abate the vain agony of the positive checks that arise among peoples in this condition, Mr. Cox puts forward three possible remedies — garden cities, emigration, birth-control. Of these the first two are dismissed for very casual reasons. He might with sound logic have condemned them on the ground that they were both no more than palliatives, mere symptomatic treatments of a morbid growth they could not cure. Instead, he brings against them arguments no stronger than the paper on which they are printed. Garden cities are useless, because "if the whole present urban population of England were to be dispersed into cities there would be very little real country left." Emigration is useless, because "there are not ships enough in existence to transport human beings at the rate that would be necessary to relieve overcrowding in England," because the population of England and Wales was increasing at the rate of 390,000 a year in 1921. Now the facts of the matter, according to the last census data available to the reviewer, are these. The area of the urban districts of England and Wales at the time of the 1911 census was 4,000,000 acres, the contained population 26,000,000. Corresponding figures for the rural districts were 33,000,000 acres and 4,000,000 people. Distribute the whole urban population over the rural districts at the garden-city rate of 25 to the acre, and how much rural land will disappear? Such a change as this is of course quite impracticable, but by no means for the reason that Mr. Cox suggests. As to emigration, the return for 1912 shows that 650,000 people left the United Kingdom that

year for non-European countries, and that most of them did so with the intention of making a permanent settlement in a British dominion or the United States. "Not enough ships in existence?" More than enough. Taking into account immigration from non-European countries and the traffic with the Continent, the net loss of population is reduced to about 240,000 a year. The census figures of 1901 and 1911, combined with the total numbers of births and deaths between whiles, show a net loss of population of about 500,000 people in the ten years' period. A discrepancy, therefore, exists here which is quite inexplicable on the assumption that all the relevant statistics have been accurately compiled.

But even if the balance one way or the other were very small, a difference in the age-grouping of the two streams of a large total movement should certainly have very important consequences. A country whose young people emigrated to sell their labor to greater advantage abroad might be a sad place in which to live; but if these emigrants returned in later years to live on their savings in the old country, it would not be easy to establish a direct relation between high numbers of people and low standards of living. Mr. Cox does most discredit to the remedy of emigration when he points out that the newer countries which are open to immigrants are by no means eager to secure large numbers of the urbanized classes of Great Britain. They prefer men of sounder mind and body, who can brace themselves for a sterner struggle against the difficulties that nature sets in their way.

Discussing the remedy of birth-control, Mr. Cox closely engages himself in reasoning against prejudices, a mode of thought in which he excels. Wars, social progress, racial improvement, are discussed in three vigorous chapters, and in a fourth and concluding chapter the arch-enemy of opposition — putatively religious — is exorcised with as much potency as a layman in medicine and religion can hope to attain. His chapter on social progress is written largely in defense of Malthus and against socialists of the box. The interaction between birth-rate and real social progress is not emphasized as it might be. He quotes indeed the following statement of Mr.

Hobson's: "If the ordinary man and woman are to win sufficient freedom from the drudgery of routine industry, sufficient leisure for the education and cultivation of the taste and interests which enrich personality and raise the value of life, this can only be obtained on condition of some limitation of the number of mouths to be fed and bodies to be clothed and housed." But since the book is polemic, this sentence, or perhaps its maker, is used only as a missile to be thrown against the heads of opponents. If Mr. Cox's attitude had been more constructive, he would no doubt have used it as the foundation and headstone of his logical edifice. But unfortunately he never seems thoroughly certain that the world can really be made so very much better than it is at the present time. That it shall be preserved against decay appears to be his strongest hope.

In Mr. Carr-Saunders's *Population Problem* we find opinions of quite different color. The world is not only doing well: it is always doing as well as it can. The book is described as "a study in human evolution." It begins in zoölogy, and passes on through anthropology and sociology to economics. We may perhaps regret that the biological introduction is so largely zoölogical in outlook. The population problem is of course, first and foremost, a biological problem, but the biological science best fitted to deal with it is not zoölogy, but rather ecology, the science of the balance of species, the comprehensive physiology of life in all its forms. From his study of uncivilized men of the present day, he evolves an account of the checks to population that have been developed by primitive men. Disease in these circumstances is of little account as a factor of elimination. The checks to population are almost entirely the results of human action or inaction. In this study of the checks to population Mr. Carr-Saunders makes his own and his most valuable contribution to the problem of population.

In his economic discussions, he begins with Professor Cannan's concept of an optimum size of population, the size of population which will provide in its circumstances the highest return for effort to each of its members. He goes far beyond

Professor Cannan, however, in asserting that all societies in general apply checks to population with a force sufficient to keep their numbers at this optimum level. So far as primitive races are concerned — races which have but little sentimental or religious regard for human life — his evidence establishes his case. In dealing with modern peoples, or peoples for which historical record exists, he somewhat changes his ground. He argues that in general the members of a social class will control their numbers in such a way as to maintain the standard of living that they prefer, but he does not show that this is necessarily the highest standard that they can attain. For all he says, the conventional standard may be far lower than it might have been if numbers had really been kept down to the optimum level. A condition of over-population, according to his view, can arise only when a class or a nation has experienced long and persistent demoralization from wars, disease, or environment.

It is better to delay a more serious assault on Mr. Carr-Saunders's position to the time when Dr. Pearl and Dr. Reed have published further mathematical studies on the growth of population. Their curves of population growth seem to suggest very strongly that the best point at which to stop increase is approximately the point at which increase is proceeding most rapidly. Their sigmoid curve of increase is of the same character as Professor Cannan's sigmoid curve of returns. To discuss the two curves in relation to one another and in relation to Mr. Carr-Saunders's theory of an optimum population would involve an argument into which it is inopportune to enter here and now.

Of the two expository books on population, Professor Reuter's book, *Population Problems*, can be dismissed briefly. It has the great merit of being iconoclastic, if iconoclasm can be held a merit in a textbook. But the author unfortunately seeks to gratify his destructive instincts by an assault on the *Essay on Population*. The poor temper of this attack is altogether out of harmony with the rest of the book, which, tho somewhat disorganized, is written with great shrewdness, and can be read with much profit.

In Mr. Harold Wright's book on *Population*, there is to be found an almost perfect statement of the whole problem. Everything that it contains is mentioned in the right place, the right way, and the right temper. If perhaps a few errors of fact exist in it, they do not weaken in any way the structure of the book.[2] In such a case as this, the reviewer's only duty is to offer a few comments and suggestions which may perhaps be considered for inclusion in subsequent editions.

In the first place, there should be some treatment of the opinion of Mr. Hobson, just quoted. Curiously enough, Mr. Wright has probably already had notice of this matter as a member of the Advisory Committee on Fisheries Research. Young plaice were transferred from their nursery-grounds to the richer feeding-ground of the Dogger Bank. Being here a limited population without a birth-rate, they grew much more rapidly and to a greater size than their fellow plaice left behind to compete with one another for food in the less favorable conditions of the coastal waters. The fact that Professor Bowley has shown the average income of a British family to have been about £154 in 1913 does not justify the somewhat unhopeful conclusions that are drawn by Mr. Wright. It is a purely hypothetical statistical average, which has no industrial or social significance. To show that poverty is unavoidable in some degree in Great Britain at the present time, it is necessary to establish a disharmony between the population and one or more of the factors of production. The possibility that such a disharmony may come into existence at some future time is of course well discussed by Mr. Wright, but the possibility that it now exists he does not consider.

The chapter on international relations might perhaps be slightly enlarged in order to mention the large foreign laboring populations in France and Germany and the very low rate of emigration from these two countries. Could not some reference also be made to the character of immigration, from Ireland and the Continent, to England and Scotland at the

2. Since the book was written, a reëstimate of the coal resources of China has been made, greatly reducing their size. England has also realised the existence of a new industrial asset of great value in the Somerset oil-shales.

present time and since the opening of the New World? The transmission of industrial skill and invention plays as great a part in the problem of population as the transference of manual labor.

Of the five writers, Professor East alone refers to Liebig and the great problems of soil-fertility and soil-exhaustion, tho all, of course, make reference to Malthus. Liebig's great contribution to the problem of population was his law of the minimum, according to which the yield of a given crop will be limited by the amount of the one particular requirement which may happen to be deficient. This law is also known, more generally, as the law of the limiting factor. The deficiencies most commonly experienced in agriculture are deficiencies of suitable compounds of phosphorus, nitrogen, or potash. It is necessary to face the assumption that a world-wide deficiency of some factor of production of this, or some other kind, may create a world-wide economic problem at some future date. Sir William Crookes predicted a deficiency of nitrogen compounds. Professor East and Sir John Russell [3] and Professor C. G. Hopkins give warning of a possible shortage of phosphorus. Such predictions cannot come directly true. If no way can be found by which to dispense with the aid of such factors of production, they will still be procured. But in so far as the difficulty of obtaining them increases, so far will the need for a sacrifice of other benefits arise.

The world-problem of population is a problem of energy-supply. Mr. Cox and Mr. Wright both speak of Great Britain's fuel-supply, tho Mr. Wright alone refers to Jevons. Now it may be said that man alone of all the animals may feel the pressure of population as soon as he begins to lose, through the presence of his fellows, the enjoyment of any single thing that he values. Solitude and multitude cannot exist together. Supply and demand of the products of wild life, animal and vegetable, sharply separate as population and settlement expand. Supply of the products of

3. A footnote in Soil Conditions and Plant Growth, by Sir John Russell, states that Liebig was anticipated in his enunciation of his law of the limiting factor by "certain economists of the Malthusian school." Who were they?

cultivated life, both animal and vegetable, can increase only under a condition of diminishing return. But the opportunities to obtain chemical elements and inorganic compounds are much less restricted, because very few of the elements are not widely diffused, if only in small proportion, throughout the upper layers of the earth's crust. Within recent times, modern science has put at our disposal a knowledge of chemical reactions and a command of temperatures which make it possible to separate even these traces from their containing material, provided only that we pay for them a sufficient price in energy.

From the point of view of present-day industry, the problem of energy-supply is a problem of fuel-supply, and at that a problem of mineral fuel-supply. Other sources of energy, such as tidal and river-power, are at present only subsidiary, and seem likely to remain so. And it is hazardous for the economist to build excessive hopes on the prospect of the discoveries of other sciences. Sir Ernest Rutherford has given a warning against the expectation that the atom contains enormous stores of energy, on which we shall some day be able to live at leisure. On the other hand, Professor Eddington has suggested a new source of energy in the nucleus of the hydrogen atom. The prospects of industrial photosynthesis rest on much surer ground than do these physical speculations. But as economists we shall do well to heed Professor East's warnings, even tho we may not agree with his scientific arguments, and to suppose that in the future we may have to depend greatly for our fuel-supplies upon the combustible materials built up in sunlight by the green plant. Such a development indeed has already begun to take place.

In theory, at least, a permanent system of agriculture should be able to yield a steady supply of pure carbohydrate vegetable fuels for an indefinite length of time. In practice the case may alter. We must, therefore, presume that our permanent system of agriculture, whether it supplies foods, fuels, or raw materials, will itself require a steady supply of the factors of fertility — phosphorus, nitrogen, potassium, or what

not. And the supply of these factors will be, even more than it is now, an industrial problem rather than an agricultural. Will it be easy or hard?

This question may be set aside for the moment, to make way for a discussion of the concepts of energy-income and energy-fund. The available energy-fund is our store of mineral fuel, which can be used fast or slowly, according as we find need and opportunity. Our energy-income is to all intents and purposes the stream of energy that flows in upon us from the sun. With no great risk of climatic disturbances, we can convert a portion of this radiant energy into the chemical energy of plant substances and thence into mechanical energy. But the law of diminishing returns in agriculture, in whatever form the biologists finally state it, gives warning that there must come an upper limit to the energy-income that we can thus collect. Quite conceivably, the law of diminishing returns may, in its final form, become identical with the law of the minimum.

The allocation of the energy-income to various uses creates two main problems. The first is this: what part of the energy-income will need to be expended in maintaining the energy-income? The second: how will the remainder of the energy-income be employed? The first question is, of course, only a more general form of the question raised by Jevons. He argued that the coal-supplies of Great Britain would never be entirely exhausted, but that, under the conditions of production and consumption now prevailing, the price of coal in terms of coal would steadily increase. If our energy-income from vegetable sources should come to be dependent upon the supply of inorganic factors of fertility, produced by industry, a very similar situation might arise. In such a case, the two problems of allocation blend into one and we return to our earlier conclusion, that so far as the supplies of chemical elements and inorganic compounds are concerned, the world need never go short of what it wants, provided that it will pay the required price in energy. Will it be able to pay this price? We of the present generation are using the world's cheapest fuels to smelt its richest ores. What do we leave for future

generations? The question cannot be answered, and it is not worth answering. The really important question is this: what of the future generations that we leave? what of their skill, and what of their numbers?

Concerning their skill we can make certain broad predictions with some confidence. In general, every industrial process is performed in three stages — extraction, separation, and elaboration. In the process of separation, the raw material of field, forest or mine is split up by physical or chemical means into materials sufficiently simple to be elaborated into finished products. Modern industry is sufficiently resourceful to be able to find a use for, and to give value to, nearly every simple substance separated out from the original raw material. The degree of refinement with which the work of separation is carried on is determined by the quality of the simple substances required for the elaborating process, the quality of the raw material provided by the extractive process, and the difficulty of doing the work of separation.

It has been said already that this difficulty is in general a difficulty of energy-supply. There is no reason to suppose that there will ever come a serious decline in the efficiency of the extractive or elaborating processes. Mining is at the present time pursued in very remote places and at great depths. We can also expect that a steady stream of mechanical, metallurgical, and chemical inventions will flow into industry for many years and many generations to come. On the other hand, there is not the same hopeful outlook for the separative processes. As time goes on the work of separation will become steadily more and more difficult. Inventions will, of course, increase efficiency to some extent from time to time, but, failing some unpredictable and epoch-making invention, as important as the steam-engine or the printing-press, — some way of separating simple substances from complex raw materials vastly better than it can now be done, — it is practically certain that the industry of the future will here encounter difficulties very much greater than those which we experience in the same field at the present day.

Is there any remedy for these difficulties? There is, and it

is a remedy that economic theory provides. A condition of diminishing returns with increasing effort and production is also a condition of increasing returns with decreasing effort and production. The difficulties of the future may be likened to a barrier over which it is very hard to climb, but under which it is very easy to pass. Reduction — reduction of population, reduction of effort, reduction of production — may well be expected to bring about an increase in the rate of return. It seems reasonable to suppose that the most profitable size for the population will come in the long run to be less than the population of the world today. If only our reasonable suppositions can be crystallized into reasonable conduct, we can bid farewell to pessimistic fears.

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WOLFE'S CONSERVATISM, RADICALISM, AND SCIENTIFIC METHOD[1]

WHY are some people conservative, others radical? Can the bitterness between right and left wings be softened, before their conflicts destroy civilization? To these large problems Professor Wolfe addresses himself; and, as one might infer from his own title no less than from the caption of his book, he thinks that social-psychological science supplies keys to both puzzles. The essay was provoked largely by three groups of stimuli: the smug prejudices of the average American undergraduate, the white and red terrors in all countries since 1914, and, not least, the glowing promises of the psychologies.

1. Conservatism, Radicalism, and Scientific Method. By A. B. Wolfe. New York: The Macmillan Company. 1923. Pp. 354. $3.50.

In attempting to account for radical and conservative attitudes, the author naturally makes many concessions to the Marxian doctrine: people whose material comfort, relative to the rest of the population, is favored by the existing social system, are not good "prospects" for radicalism. And naturally the numerous exceptions to this simple scheme are immediately noticed.

The author accordingly attempts to refine these crude generalizations by the application of several psychological principles. His approach is reminiscent of that of Carlton Parker (tho he is much better versed in details than was Parker). He emphasizes the determinist point of view, in opposition to personal-praise-and-blame reactions; and he stresses emotional factors according to the psychoanalytic, or Freudian, concepts. Thus, he considers that radicalism usually springs from obstructed desires, and states that similar revolts are often suppressed or sublimated, so that the individual is able to preserve an appearance of conservative respectability. The psychiatric doctrine of "rationalization" appears frequently. Yet alongside these psychoanalytic rubrics the author eclectically introduces materials from most of the other sects which call themselves psychological: behaviorism, endocrine glands, Giddings's mental types, and the popular instincts. Instinctive fear of change, for example, is held to be a mainspring of conservatism; and again, in connection with radicalism, we read: "That there are positive instinctive tendencies which give rise to desire for innovation cannot well be questioned. These include curiosity (the tap-root of all science), workmanship and contrivance (the root of the practical arts), and esthetic self-expression (the root of the fine arts)."

When the author has done with the motivation and characteristics (including modes of behavior, or "methods") of conservatism and radicalism, he comes to scientific attitude and method — and, curiously, he does not inquire particularly into the "motivation" of this third attitude. He contrasts at length the scientific temper with "popular-mindedness," and he sketches the development of scientific method — all with special reference to the difficulties of pre-

serving one's balance while dealing with social issues. The characteristic statement comes out: "No one who does not become a thoro-going determinist can ever completely acquire the scientific attitude." That this is putting it a little too strongly is believed by many of us who agree that the mechanistic hypothesis is more probable and more productive of new knowledge than the anthropomorphism which appeals so strongly to scientists as well as to other sorts of people.

A few observations must be selected, with reference to the adequacy of this analysis. First, the earmarks of conservatism and radicalism are not as sharply drawn as one might expect. Is the difference well stated as attitude toward change — the radical urging, the conservative opposing? In Russia, and even in "progressive" countries, one supposes that there are numerous conservatives who are profoundly dissatisfied with the *status quo*. The conservative proponents of the Mellon plan of tax revision were demanding change. It seems possible, too, that we are often conservative on some matters and radical on others — politics and divorce, for example; but this question of correlations is not raised. The lesser biases of scientists, again, are not very closely noticed; it does not seem to occur to the author that many of his brethren will regard his selection and interpretation of materials as somewhat partisan rather than scientific. All these weaknesses are referable to his failure to apply statistical concepts to his problem.

My second critical observation is that the psychological analysis is naturally exposed to whatever weaknesses may develop within its various foundations. The gaps are wide between normal human mass-behavior, which the sociologist is probing, and the nervous physiology, the animal instincts, and the mental-disease phenomena from which he draws his explanatory principles. Several psychologists, therefore, are questioning seriously whether McDougall's instincts and the Freudian schemata are not as far from fundamental elements as the *ad hoc* "instincts" (such as religious) which McDougall rejected. Consequently, while the doctrines offered here, and the "illustrative" matter with which they are applied,

supply numerous interesting hypotheses, I think the author would have been on solider ground if he had given more attention to the question of objective and statistical methods for testing such deductions.

After his investigation into the natural history of conservative, radical, and scientific attitudes, Professor Wolfe considers the ethical aspects of these conflicts. Along what lines, if any, he inquires, can the conservative-radical struggles be ameliorated or adjudicated? He preaches the utilitarian gospel, and rejects metaphysical absolutes of all sorts, whether religious or sociological. Behavior is to be judged morally by its effects on the happiness of the greatest number. This individualism as to the *ends* which are called finally good, however, is distinguished sharply from *laissez-faire* individualism as to the social *means* for promoting the general welfare; the latter, of course, our author rejects. He asserts, moreover, that his ethical democracy does not imply uniform treatment of all persons; it does imply the giving of opportunities in accord with scientifically demonstrated capacities to use such opportunities.

This discussion seems mainly sound and searching, if not very compact; but at least two of the principal contentions are not demonstrated. One is that this ethics is supplied with a scientific basis by the new objective psychology. I doubt if much has been added, in essentials, to Bentham's or Mill's statement of the case. The other proposition which is not convincing is that popularization of the scientific attitude will greatly diminish the conservative-radical warfare. The author does, indeed, adumbrate, at numerous points, a qualification: "The world needs to be converted to Christianity almost as much as it does to science." He asserts that pugnacity and acquisitiveness must be more largely replaced by sympathy and toleration. He would doubtless go far toward agreeing with Bertrand Russell's recent gloomy pronouncement, that "science has not given men more self-control, more kindliness, or more power of discounting their passions." (*Icarus.*) But he does not set forth clearly enough, I think, the difference between an objective, scientific attitude in dis-

covering matters of fact (including other people's desires) and objectivity or impartiality in loving one's neighbors well enough to be a good citizen.

The foregoing criticisms have been directed at the book in its character as a piece of scientific pioneering in a vital and baffling subject. They are of less consequence when one considers it as a textbook, as an introduction to the study of social problems — altho here I must add that the exposition leaves a little to be desired in the way of lucidity and economy of words. A good many teachers, nevertheless, are likely to adjudge the essay a valuable instrument for correcting conservative or radical astigmatisms of undergraduates, or other sophomores.

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